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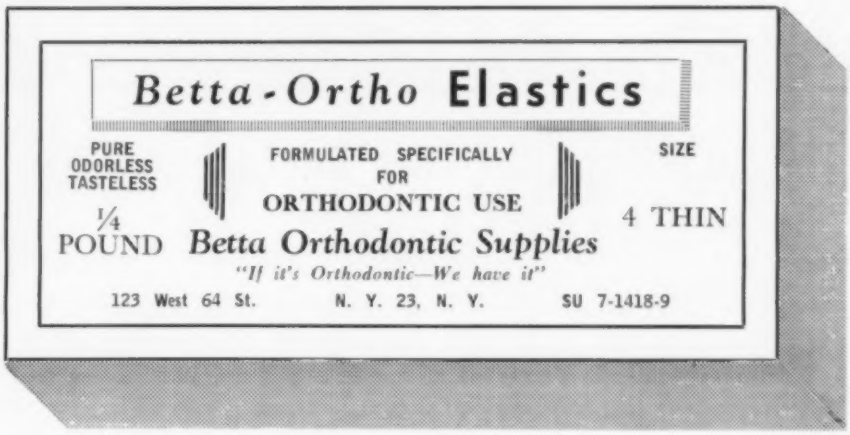

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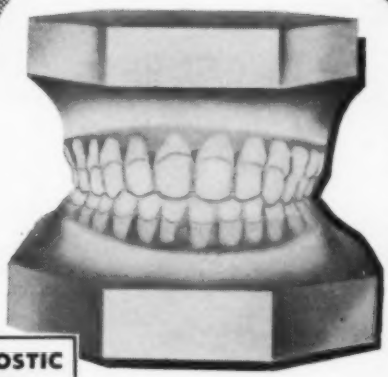

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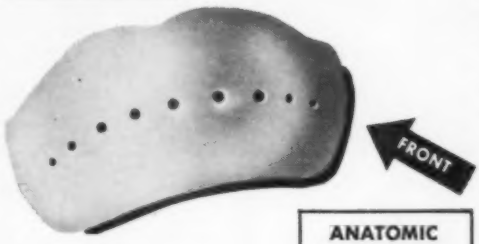

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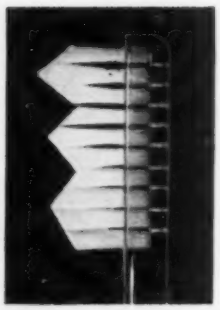

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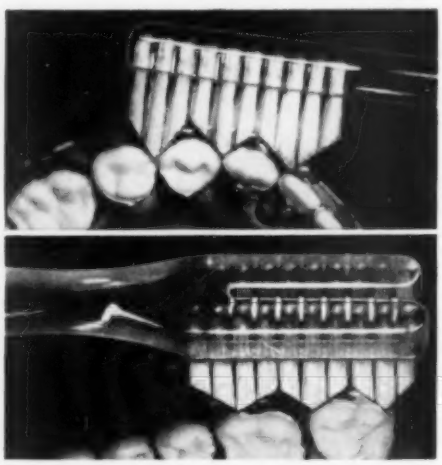

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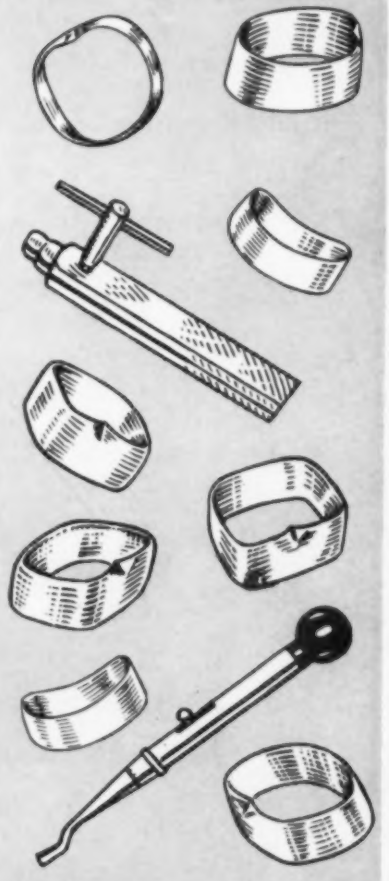

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American Journal
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VOL. 41 MAY, 1955 NO. 5

Original Articles

PRESIDENT'S ADDRESS, GREAT LAKES SOCIETY OF ORTHODONTISTS

ROBERT E. WADE, D.D.S., COLUMBUS, OHIO

GREETINGS and welcome to this, the Silver Anniversary meeting of the Great Lakes Society of Orthodontists. I feel that I should say "Welcome again to the City of Detroit in the name of Dr. Louis Braun, whose devotion and guidance initiated the proceedings which have culminated in our twenty-fifth annual meeting."

As you no doubt are well aware, the Great Lakes Society of Orthodontists was organized in 1926 here in the City of Detroit, and returned to the same place for the next two meetings. Our organization has therefore returned to the scene of its birth in appropriate recognition of this milestone in its history. Because of the requirements of the war effort in the 1940's, there were three years wherein no annual meeting was held and it is for this reason that we now recognize this as our twenty-fifth or Silver Anniversary meeting.

It is a pleasure and a privilege to be able to salute many of the men who participated in the creation of our Society and in the conduct of its affairs during the formative years. Our present state of well-being and the measure of respect with which we find ourselves favored are proof enough of the wisdom and foresight of our early leaders. It is most reassuring to know that many of these same men are still active and are available for counsel and help. The continuing growth of our Society, in numbers and in professional stature, has been the result of the wise guidance and direction of succeeding groups of officers and committees throughout the subsequent years. To all

Presented before the Great Lakes Society of Orthodontists, Statler Hotel, Detroit, Michigan, Nov. 1, 1954.

of our members, then, who have made their contributions to the development of the Great Lakes Society of Orthodontists throughout the past two to three decades, may I propose the professional equivalent of a twenty-one-gun salute.

In years past, our scientific programs have been of such quality that they have contributed in a very real sense to the growth of the Great Lakes Society. The numerous essayists and clinicians, therefore, must be accorded a share of the spotlight. The essayists, clinicians, and various committees serving our current meeting are continuing the traditional level of excellence, and I should like to express appreciation to them individually and collectively for their contributions to the success of our present meeting. I should like also to express my appreciation to the membership at large for giving me the honor of serving as president. Such an honor must, of necessity, be some sort of zenith in the life of any professional man.

To pass along now to another traditional function of the president's opening remarks, it behooves the speaker to make certain suggestions which, in the light of his own experience, might contribute in some small way to the smooth operation of the Society. The untimely and tragic loss of our president, Dr. Braun, has, of necessity, focused attention upon the chain of events that such a loss creates. Before making specific suggestions, it might be well to review these events so as to provide a basis for comparison.

Our constitution stipulates that in the event of a vacancy in the office of president, the president-elect immediately assumes this position. This, of course, creates a vacancy in the office of president-elect. By constitutional provision, the Executive Committee is required to name a replacement to this office. In the present instance, the Executive Committee was fortunate in that the call to duty was accepted by our immediate past-secretary, Carl Anderson.

The recommendation that I should like to direct to our Committee on Constitution and By-Laws for their consideration involves a change whereby vacancies in strategic offices, including that of president, shall be filled by action of the Executive Committee. The reason for this suggestion is very obvious: It would permit the continuance in the office of president of a man who would be serving our annual meeting either in or near his home town. This has been the custom, with few exceptions, during the past quarter century of our existence.

At this point, I should like to emphasize the fine cooperation that all the committees have given in their effort to stage the kind of meeting that would do justice to our anniversary and to the memory of Dr. Louis Braun. The duties of president have been relatively light for the incumbent, as a great portion of the work had been started; my concern, however, centers about the inconveniences of next year when Dr. Anderson of Grand Rapids will be planning for a meeting in Columbus, Ohio.

The thought behind my suggestion is not intended to alter the present situation, but rather to prevent a repetition of the same sort of displacement in the future.

As we observe our Silver Anniversary, it would seem fitting to inquire briefly into the nature of our origin as individual members of a professional society. A review of our collective background prior to the formation of the Great Lakes Society reveals that about 73 per cent of our charter members received their initial orthodontic training from one of three proprietary schools. A mere 12 per cent were university trained, while 15 per cent received their experience through association with preceptors. In the years since 1926, an interesting reversal has occurred, wherein 73 per cent of our current membership received their indoctrination through formal training, while 12 per cent stem from proprietary schools and the same 15 per cent have acquired their training through association with preceptors. This trend has long been recognized; however, the application to our own group makes the figures of more intimate interest, even though they are derived from incomplete records and represent approximate values. Further inquiry reveals that fourteen different universities, from the East Coast to the West Coast, have contributed to the schooling of our collective membership. Within the boundaries of our component are located seven dental schools, wherein orthodontic teaching is available and from which thirty to forty newly trained men emerge each year to assist in our ever-growing responsibilities. Another sidelight of some interest is the fact that about 25 per cent of our members are diplomates of the American Board of Orthodontics.

If, on the basis of past performance, we should hazard a prediction into the next twenty-five years, it would appear that professional standards and services will continue to expand and improve, and that the membership of the Great Lakes Society of Orthodontists will continue to collaborate in the advancement of our mutual endeavors.

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MOLAR CROWNS AND ANTERIOR BITE PLANES

RICHARD E. BARNES, PH.B., B.S., D.D.S., CLEVELAND, OHIO

TO ORTHODONTISTS who are familiar with the literature of bygone days, the phrasing of my title may seem antiquated or at least reminiscent of articles written shortly after the turn of the century. However, I believe that those same orthodontists will agree that, in many instances, the basic principles of our present-day mechanics can be found in the writings of the pioneers of our profession. Refinements of construction and materials have altered many of the early mechanics used in present-day orthodontics.

I mention this because the report to follow certainly is not intended as original, but rather as a description of the method employed by me for the past twenty-three years and by my father, Varney E. Barnes,[1] for many years previous to my association with him. It is a method of opening the bite that has been developed out of a combination of techniques, each of which was used by others in the past.

Before describing the use of molar crowns and anterior bite planes, as I wish to present them, I would like to review briefly the history of opening the bite with either molar crowns or anterior bite planes.

In 1904 Ainsworth[2] described the use of inclined planes of precious metal attached to incisor bands for the purpose of opening the bite. The use of these planes was advocated when it was necessary to work the upper incisors to the posterior. In 1905 Guilford,[3] commenting in his *Orthodontia* on various methods of correcting closed bites, discussed a method by Knapp, whereby curved metal lugs were placed on the lingual surfaces of incisor bands to take the posterior teeth out of occlusion. Writers before and since, such as Kingsley[4] with his method of "jumping the bite," Case,[5] Rogers, Kelsey, Grieve, Anderson, McCoy, and others, have dealt with some phase of the use of crowns or bite planes to open the bite. In extremely deep overbites, McCoy[6] recommended the placing of incisal bite planes on the lingual surfaces of the incisors. They were to aid in the elongation of the molars when used in conjunction with triangular elastics. Anderson[7] refers to an earlier article by Grieve[8] which described incisal bite planes on the lingual surfaces of incisor bands, so placed as to have an inclined surface to guide the lower incisors, and thus the mandible, into a forward positioning. Such a practice very easily could put undue stress on the upper incisors, with resultant loosening and damage. Anderson further cautions that additional support for these planes is necessary to prevent destruction and depression of the upper incisors in their sockets.

Presented before the Great Lakes Society of Orthodontists in Detroit, Michigan, November, 1954.

It was the belief of Mershon[9] that when the anterior teeth took the stress of mastication in opening the bite, these teeth were depressed. However, Hemley[10] and his co-workers at New York University disagree. My personal observation is that when molar crowns are placed on the two upper first molars for the purpose of opening the bite, these teeth may be depressed. I have seen this happen on various occasions. Waugh[11] has used molar crowns in cases of open-bite in order to depress molars and he reports his results as successful. If such be the case—and I am sure that it is—we should not attempt the opening of the bite by molar crowns or by incisal bite planes alone. Both Pullen and Ketchum reported that individual bite planes attached to incisor bands cause depression of these teeth. In selected cases from my own practice, a combination of the use of molar crowns and of anterior bite planes has proved successful.

In 1882, Kingsley[4] first reported on a method of "jumping the bite." According to Grieve,[12] Hawley originated or first suggested the incisal bite plane and Grieve felt that in his practice he was really "jumping the bite," as did Kingsley. Case[5] placed anatomic molar crowns on the lower molars in conjunction with a full banding technique to establish a new line of occlusion. The literature is full of articles covering the use of molar crowns or incisal bite planes. Used singly, these techniques have not been acceptable to many clinicians but, used together, they have proved to be a most workable and satisfactory combination. With few exceptions, the occlusal surface of the molar crowns should be flat, allowing for the mesial or distal movement of the crowned molar or, if such is desired or feasible, for the new adjustment of the mandible. The anterior bite planes should be horizontal or parallel with the occlusal plane and should not be constructed with an incline such as might be used on a bite plate or a guide plane.

Occlusal interference has to be overcome before we can adequately handle many of the problems confronting us in orthodontics. Numerous are the cases of distoclusion in which an almost instantaneous forward positioning of the mandible results when the occlusal interference is relieved. Jackson[17] has his patients position the lower jaw in such a manner as to be pleasing to the operator and to eliminate occlusal interference. This he refers to as "the position of occlusal preference." The judgment of the operator is extremely important, and experience seems to be the best guide yet conceived as to whether or not one can accomplish, by mechanical means, the dictates of his diagnosis. Kelsey[13] has said, "Some distoclusion cases practically correct themselves when all interference is removed." Howes[14] describes two cases in which the position of the mandible was altered as soon as the occlusal interference was removed.

The majority of the appliances used to open the bite or to remove occlusal interference are limiting in their action in that the desired individual movement of teeth is restricted or prohibited. We have found the flat-surfaced molar crowns and the noninclined anterior bite planes to be advantageous. Where improvements of the mesiodistal relationship are desired,

the molar crown may be moved in a distal direction, with the very minimum of occlusal interference, while at the same time it is aiding in holding the bite open. The conventional bite plate does not permit such individual tooth movement, nor does the guide plane, and when I refer to this point let none assume that I mean to detract from their advantages where indicated. It is important that the diagnosis be correct before an appliance is placed to open the bite. It must be determined whether the upper molars and premolars must be moved distally, whether the mandible alone must come forward, or whether both are desired. There are those who will question the possibility of moving molars distally. We do get a change in the molar relationship and in the jaw relationship, however. It is possible that this change in molar relationship may be brought about by an inhibitory action on the growth of the maxillae, while the growth of the mandible progresses unhindered. My clinical experience leads me to believe, however, that upper molars can be moved distally. In this respect, Fischer[20] attributes the success of his treatment of Class II, Division 1 (Angle) cases to his ability to move molars distally, but not to moving all the upper teeth posteriorly en masse.

Many times, when opening the bite, I have wanted at the same time to move the anterior teeth to the posterior but have been limited when a bite plate was in use. With individual biting surfaces on the lingual of anterior bands and flat crown surfaces on the molars, I have been able to proceed with intermaxillary force and to move each tooth individually in whatever direction I desired in the horizontal plane. Frequently the fitting of individual bite planes to the two central incisor bands will be adequate in the anterior region. It is a good precaution to distribute the load by coupling in the lateral incisors, either with individual planes or with some anterior attachment to form support with the central incisors. Rotations of incisors may be carried out at the same time. These individual tooth movements are the reasons why I select this type of appliance. I have found it to be a prized addition to the other appliances used in my practice. I am one who has not found the one ideal, universal appliance. Tedious as it may be to tailor-make an appliance when the occasion arises, that procedure, in my opinion, is not only indicated but dictated.

TISSUE CHANGES

According to Breitner,[15] we can hope for and expect changes in the temporomandibular joint when forces are applied to change the position of the mandible. These forces must be gentle, however, for if they are not, as in instances of true "jumping the bite," the tissue changes about the teeth may be destructive enough to offset any favorable changes at the joint. Breitner further demonstrates that, when the bite is raised or opened, the changes in the joint are manifested by a transformation of the neck of the condyle and a reorientation of the glenoid fossa in an anterior and downward position. It would seem, however, that Brodie[21] and others, in isolating the growth centers, rule out the Breitner contention that the position of the glenoid fossa is

altered. Indeed, Thompson[19] insists that the mandible assumes its positional relationship with the skull when an infant is 3 months old and does not change thereafter. The possibility of altering the position of the glenoid fossa, then, seems to be a matter of controversy.

In cases of deep overbite, it is the vertical height that we wish to increase, or the distance from the base of the skull to the lower border of the mandible. According to Breitner,[15] this is brought about both by an increase in the vertical height of the alveolar process about the posterior teeth and by an increase in the vertical height of the neck of the condyle.

In referring to deep overbite cases, Thompson[18] states, "Only the functional analysis of observing the patient with the mandible at rest position will reveal the true nature of the vertical discrepancy in the denture." He continues: "The normal occlusion and its presence or absence is a significant feature in the analysis, classification and treatment plan for malocclusion of the teeth." He maintains that, if the mandible in distoclusion cases maintains itself in a Class II (Angle) relationship in the rest position as well as when the teeth are in occlusion, the mandible cannot be repositioned anteriorly. The work of Thompson[19] on determining the true rest position could well be followed as an aid in our diagnosis of deep overbite cases and in determining the limits to which we could expect to open the bite with permanency.

Breitner states that the relief of occlusal interference may eliminate the need for intermaxillary elastics thereby preventing any horizontal movement of the lower anterior teeth. Because a minimum of occlusal interference is present when flat molar crown surfaces and horizontal anterior bite planes are used, the anterior movement of the mandible and/or the distal movement of the upper molars requires the minimum amount of forward horizontal force being applied to the lower teeth.

After twenty-three years of clinical experience, I can recall no instances where any unfavorable effects could be noted as a result of molar crowns and anterior bite planes. Hopkins[16] reports no changes to be excessive enough to produce unfavorable conditions in properly selected cases where the bite was opened with bite planes. Let me add a word of caution, however, that molar crowns as described in this article should never be used without some anterior support, such as the anterior bite planes on individually banded teeth, as depression of the molars will result faster than vertical height can be obtained. If, on the other hand, adequate support is established, little, if any, depression of the occluding teeth will be noted. I have always felt that the natural elongation of the posterior teeth was a safer method of opening the bite than forceful elongation. Stretching of the tiny blood vessels and nerve tissue at too rapid a speed can result in injury to the tooth. I believe that the ideal time to open the bite is when the superior and inferior premolars are in their eruptive state. The removal of occlusal interference often will make it desirable to open the bite before this state of dental development has been reached, but the permanence of the result will depend on the premolars' assuming occlusal contact. When possible, I prefer that the second molars be in

contact before the bite opening mechanism is removed. In other words, I do not feel that opening the bite with deciduous molars in place is permanent, although it may be desirable in order to overcome occlusal interference.

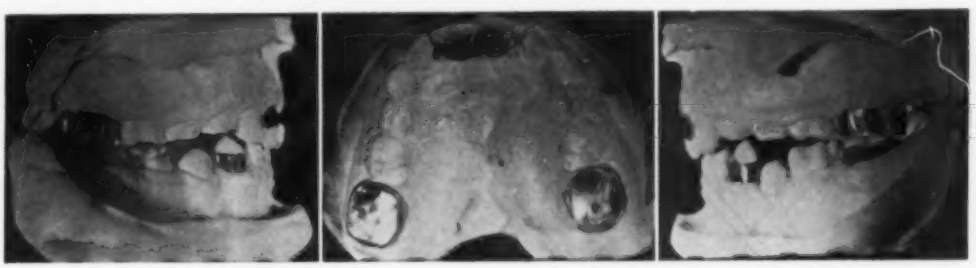
CLINICAL PROCEDURES

The usual clinical picture of the child with a deep overbite reveals either a superior anterior protraction or a mandibular retraction, or both, where the lower lip is folded forward, often with a deep crease at the mentolabial sulcus. Although the vertical height of the skeletal framework may be deficient or displaced, sufficient soft tissue exists for a normal overbite. By placing 1-inch-long pieces of cotton roll on the occlusal surfaces of the lower posterior teeth and by having the patient close his mouth on these, one can temporarily open the bite and remove the interference that may be caused by the initial contact. The increased vertical height improves the profile, and the deep fold of the lower lip straightens out. In those cases of distoclusion in which the mandible has been held to the posterior by occlusal interference, it will be noted that there is an almost immediate forward positioning of the mandible with no attempt on your part to place it so. This, likewise, immediately improves the profile and will give the operator a good preview of what he may expect in facial change. If it is then determined that the bite must be opened in order to remove occlusal interference so that the mandible may be moved forward, or that the upper anterior teeth may be moved to the posterior or for the distal movement of the molars, the construction of our bite-opening mechanism can proceed.

My initial step is to measure upper first molar bands out of .006 by .200 inch precious metal band material. This is wider than the conventional band material and must be so, in order to cover the molar crown adequately. These bands are fitted directly in the mouth with the occlusal portion contoured markedly toward the long axis of the tooth. Sixteen-carat gold sheet of 29 gauge or .011 inch in thickness is soldered on this occlusal portion of the band. These bands then are placed on the teeth and the patient is instructed to bite on them slowly. The bite will be opened and in many instances, after the interference is relieved, the mandible will assume an anterior position (Fig. 3, *A* and *B*). The patient then is instructed to bite hard, as both right and left crowns must be in contact with the lower molars. The incisor bands are constructed of .004 by .180 inch precious metal band material and are closely contoured to the teeth with the gingival edge of the band under the free margin of the gingivae, wherever possible. When the band is fitted, a careful estimate must be made as to where the occlusal plane of the lower teeth will contact the lingual surface of the bands. Considerable 14-carat gold solder should be placed at this point, then the gold bite plane, cast in advance of a hard crown and bridge gold, must be soldered in as nearly a horizontal position as possible. I have found planes that are 19 gauge or .036 inch in thickness to be quite satisfactory. They should be almost as wide as the mesiodistal width of the tooth to which they will be attached and they must be long

enough to overcome the overjet and engage the lower incisors when they are brought into occlusion. I do not believe that any anterior plane should be used that would have to be over 5 or 6 mm. in length. Only by trial and error can these be adjusted properly. Careful use of articulating paper will verify the correctness of the patient's report that both molars and the incisal planes are in contact. When one incisor is adjusted, another is soldered, the process continuing with one adjustment at a time until each plane is in occlusal contact. An added support between the plane surface and the lingual surface of the band toward the gingivae is advisable. This precaution will prevent the plane's tearing loose from the band after repeated usage.

When the bands are all fitted and the planes soldered, a compound impression is taken so that casts with the bands in place (Fig. 1) may be used to construct such other appliances as the operator may desire. A small piece of beeswax worked between the incisal bite planes and the palatal gingival tissues will facilitate the removal of the impression.



A. *B.* *C.*

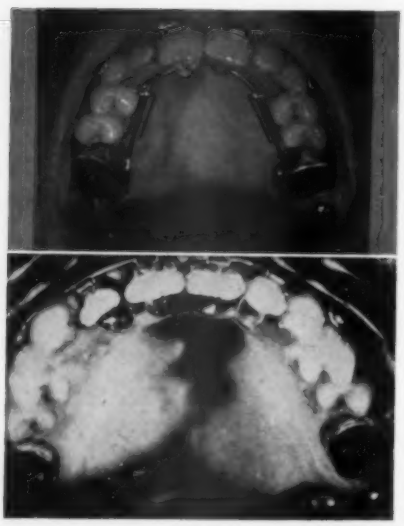
Fig. 1.—Molar crowns and central incisor bite planes on working casts of Case 469, preparatory to construction of appliances.

In some cases it is desirable to place individual bite planes on all four upper incisor bands. I find that planes on the central incisors alone or tied in with lateral incisor bands by means of a labial arch usually are adequate support with the crowned molars (Fig. 2, *A* and *B*). The method, or mechanics, of attachments of these bands to the labial arch is not important and may be selected according to the choice of the operator. In my practice, I find that .020 (inside diameter) round tubes soldered to the bands and the labial arch and connected with a pin wire, as in a door hinge, are quite satisfactory (Fig. 4). If rotation is desired, other types of attachments may be employed.

When the appliance is constructed and the bands are cemented in place, the orthodontist should inform the patient that in the next few days he will have to accustom himself to his new chewing habits. The ease with which he makes the adjustment usually amazes me. It is not too uncommon for the patient to find the new arrangement much more comfortable than his original bite.

After the premolars and second molars have elongated into contact with their antagonists, I usually keep the crowns and planes in place for approximately three months, or until I feel reasonably certain that the occlusal sup-

A.



B.

Fig. 2.—Molar crowns and incisor bite planes with labial support.

Fig. 3.—*A*, Casts of case at beginning of treatment, April 9, 1952. *B*, Photographs showing amount of opening with molar crowns and central bite planes in position. Note position assumed by mandible. *C*, Casts of case at end of retention, March 5, 1955.

port is adequate. The crown surfaces may then be removed from the molar bands. When the first molars elongate into occlusion, the anterior bite planes may be removed.

At the conclusion of active treatment, I prefer to retain my cases treated in this manner with bite plate retainers. If the overbite still is not completely corrected, the bite opening may be continued, but usually the bite plate is just an added precaution in order to gain adequate time for firm support to be established about the teeth involved.

Although there are other methods of opening the bite, this technique allows the individual movement of anterior and posterior teeth while the bite is in the process of being opened. Some typical problems that have been solved by this method of treatment are demonstrated by the following illustrations.

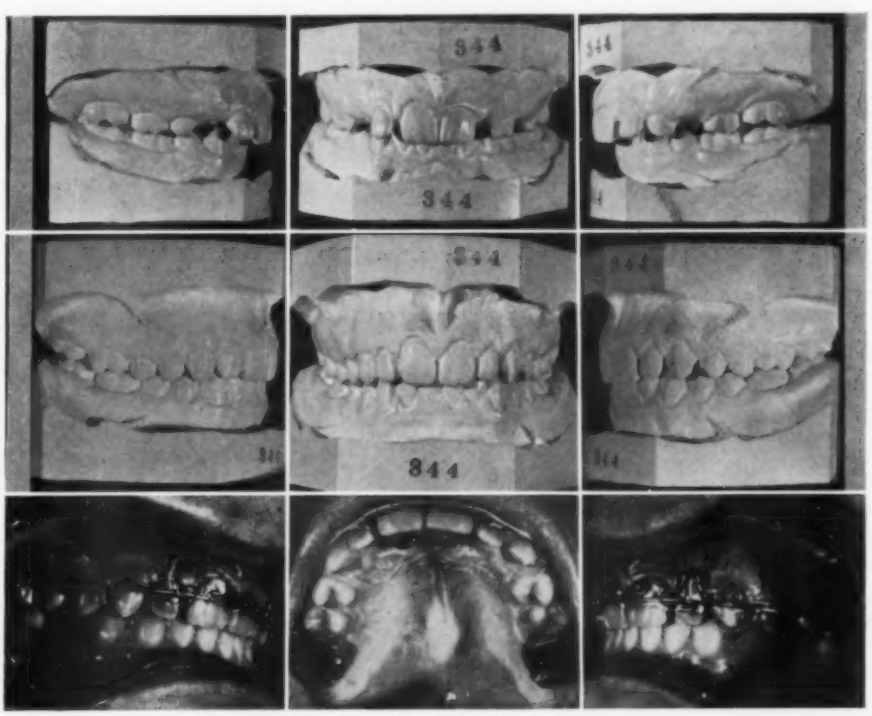


Fig. 4.—*A*, Casts of case before treatment, Feb. 10, 1948. *B*, Casts of case at end of retention, Oct. 26, 1951. *C*, Photographs of appliances, showing hinge type attachments of labial arch to central incisor bands.

For instance, in Fig 5, *A* we see more than the normal overbite, congenitally missing lateral incisors, and considerable diastemata. I decided to accept the canines in place of the lateral incisors and to accept all upper posterior teeth in mesial relationship to the lower teeth. The lower canines were in supraversion and in contact with the upper first premolars when in occlusion. This interference hindered the mesial movement of the upper posterior teeth. Therefore, molar crowns and central incisor bite planes were

employed to relieve the interference (Fig. 5, *B*) and the space closure was brought about by the use of intramaxillary elastics. It may be noted that the central incisors are given additional support by the canine attachment.

Fig. 6 demonstrates a case in which the depth of the overbite held the mandible to the posterior. Premature loss of the deciduous molars, particularly on the left side, had allowed the first molars to drift mesially. In order to obtain sufficient space for the eruption of the second premolars, I felt it necessary to increase the arch length between the molars and the anterior teeth. This was made feasible by opening the bite with crowns and bite planes, thus allowing anterior movement of the incisors and canines, as well as the anterior positioning of the mandible.

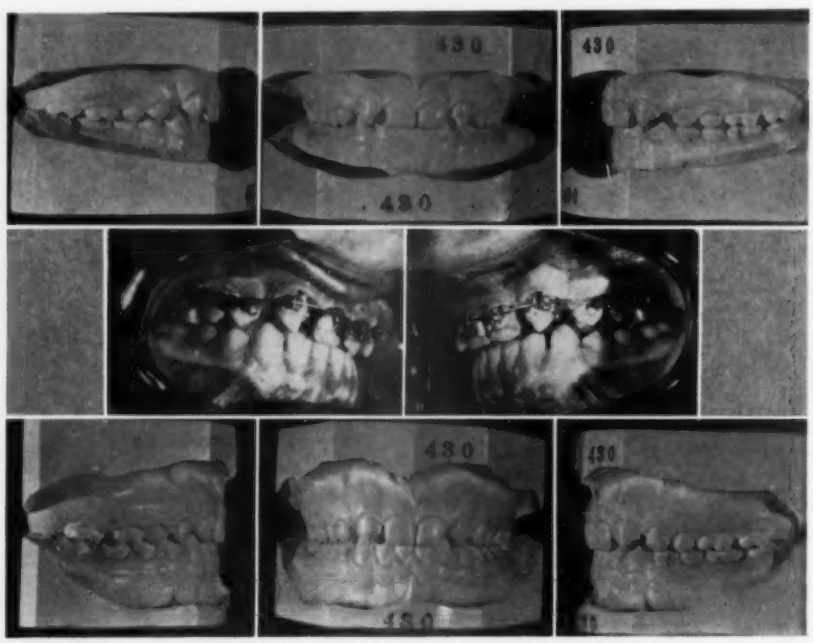


Fig. 5.—*A*, Casts of case before treatment, April 27, 1949. *B*, Photographs of teeth immediately following the placing of molar crowns and central incisor bite planes. Note amount of bite opening. *C*, Casts of case thirteen months after removal of retention, October, 1952.

Fig. 4 also shows a case in which the deep overbite contributed to the anterior positioning of the upper incisors. The upper lateral incisors were held labially by the nature of the occlusion, and the first premolars assumed an end-to-end bite with their antagonists. As the bite was opened, the upper central incisors were moved posteriorly and the roots of the upper lateral incisors were moved labially.

Case 469, Fig. 7, is one of distoclusion in which the mandible was held in a posterior position by the depth of the overbite. Opening the bite allowed an almost instantaneous forward positioning of the mandible. Rotations of upper incisors were accomplished as the posterior teeth elongated.

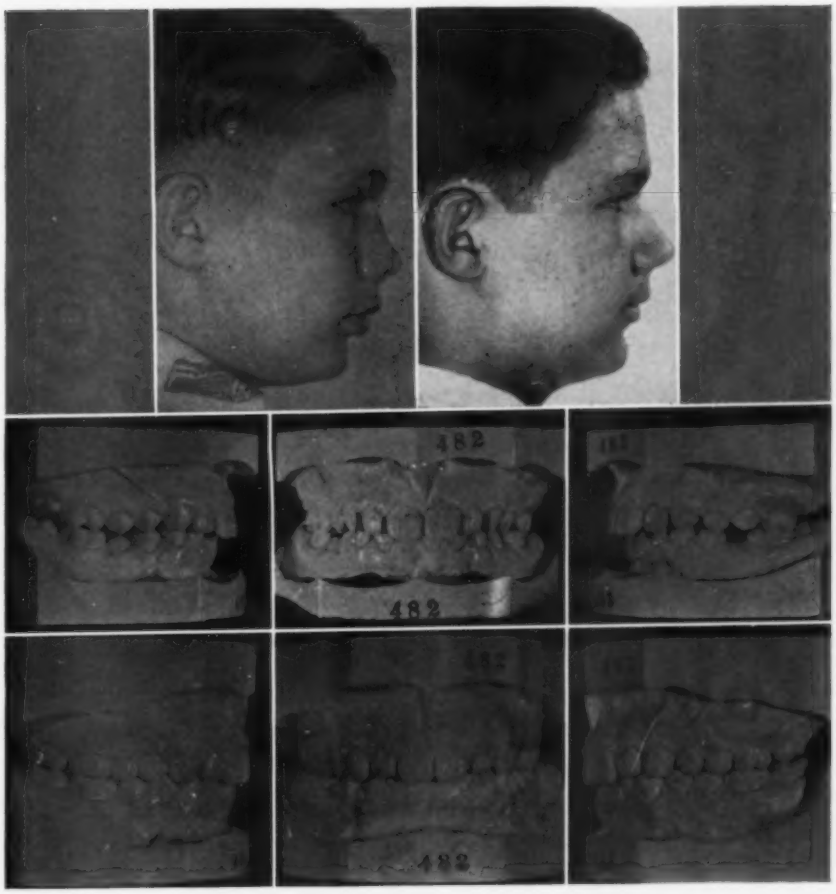


Fig. 6.—*A* and *B*, Profile photographs before and after treatment. *C*, Casts before treatment, Dec. 29, 1949. *D*, Casts thirteen months after removal of retention, May 23, 1952.

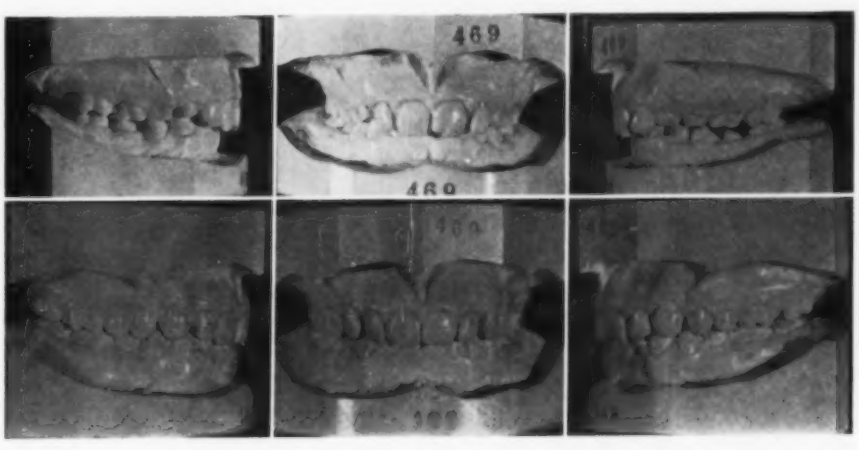


Fig. 7.—*A*, Casts before treatment, Nov. 8, 1949. *B*, Casts three months after removal of retainers, Dec. 29, 1953.

Lingually locked lower premolars are ideally relieved by the method described in this article. The relief of occlusal interference should be a primary consideration in all treatment planning. Fig. 8 reveals a narrow lower arch with both lower premolars on the left in lingual version, or the upper premolars on the same side in buccal version and the first premolar on the

A.

B.

Fig. 8.—*A*, Casts before treatment, May 28, 1946. Note upper premolars in buccal version and narrow lower premolar region. *B*, Casts at completion of treatment, March 1, 1948.

upper right in buccal version. Even though the case was not one of deep overbite, the bite was opened in consideration of the occlusal interference and in order to facilitate the correct positioning of the premolars.

A distoclusion case that responded quite satisfactorily to this form of treatment is shown in Fig. 9. The placing of crowns and bite planes resulted in an almost immediate forward positioning of the mandible. All the change in the anteroposterior relationship cannot be attributed solely to the move-

ment of the mandible, but was aided by a posterior movement of the upper anterior teeth and, in my judgment, by the distal movement of the upper posterior teeth.

All the preceding cases have been treated with the mechanism described in this article. I believe that this technique could be helpful to most orthodontists, regardless of their preference of labial attachments.

A.

B.

Fig. 9.—*A*, Casts before treatment, Feb. 5, 1947. *B*, Casts ten months after removal of retainers, April 11, 1950.

SUMMARY

The sole use of either molar crowns or anterior bite planes attached to anterior bands for opening the bite is not recommended. In combination, however, they are most satisfactory.

The crown surfaces on the molars should be flat, not anatomic, and the bite planes attached to the anterior bands should be placed as nearly parallel (not inclined) to the occlusal plane as possible.

Molar crowns and anterior bite planes are indicated in those cases which require that the bite he opened in order to relieve occlusal interference and to obtain individual tooth movements that would be limited or prohibited during the use of other methods of opening the bite.

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THE CLINICAL APPLICATION OF A MODIFIED TWIN WIRE ORTHODONTIC APPLIANCE

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IN THE later part of the last century, an appliance for the "regulating of teeth" was patented and introduced by a famous man in the history of orthodontics. In describing this appliance and its uses, he declared it to be one which could not be improved upon.

Today many principles of this same appliance are used by perhaps all of us in orthodontics. However, it is probably safe to say that no one uses that appliance in its original form.

This historical fact is mentioned to point out that there is no one perfect appliance for universal use today or at any time in the past or future.

It is to be regretted if there are schools of thought so pure that their indoctrination precludes the values of other philosophy or mechanotherapy. The broader perspective must be realized and rendered useful, especially to those who will make up the ranks of tomorrow's orthodontists.

It is good to have lived through that era in which, in the beginning, a group of men using precious metals looked down upon those using chrome alloys. It is equally good to see that this conflict has all but died out. It is safe to state that there probably are many young men who do not even know that it once existed.

Perhaps the entire picture of appliance therapy will so change as to completely erase any possible fanatic adherence to one separate means of moving teeth.

Much has been done with the science of cephalometry to indicate that most appliances accomplish the same end result with a given problem in malocclusion.

To practice orthodontics today means a more constant attention to study, just as the practice of surgery today involves more advanced ideas in technique. Both are based upon an increased knowledge of what can be accomplished. To research, without question, goes the credit for these facts.

It is good to see a definite, concrete plan on foot which will standardize the education of an orthodontist preparatory to his becoming one of the organized professional specialists in that field. To those of us who have seen the transition, it should serve as a sign of increased learning and proficiency in our field. May it bring with it an increased understanding of the science which makes us successful, and a means of relying upon not one narrow line of thought, but upon a freer exchange of ideas and principles.

Presented before the Great Lakes Society of Orthodontists, Detroit, Michigan, Nov. 3, 1954.

There are as many techniques of appliance fabrication as there are hands accomplishing the operation. There was a time when even rumor had it that a peculiar property of steel alloy caused an injurious electrolytic action in the mouth. This has been largely disproved, if successful usage is a criterion. The important fact is, and rightly should be, that the appliances be effective; and equally important is the demand that they be adequately maintained.

A highly respected authority was teaching a postgraduate course in the fabrication and use of the twin wire appliance. He demonstrated and used a particular type of molar band, probably because he was most accustomed to its properties.

A group of men enrolled in the course, after having returned to their offices, decided to utilize the technique of therapy, but with such variations that would allow the transition to take place with the least interruption.

Inasmuch as the appliance obviously begins with molar anchor bands, the initial modification was at that point. These men had been utilizing preformed chrome alloy molar bands for a period of years and believed that they best knew the technique for their employment (Fig. 1).

Inasmuch as the technique formerly employed by these orthodontists utilized a very minimum of soldering to chrome alloy, the next step was to perfect, or at least to experiment with the hope of perfecting, this technique. The post-graduate course featured soldering, almost entirely, of chrome alloy to precious metal.

After various trials and errors, a successful and routine technique was developed. After a time, even auxiliary springs could be included in a soldered joint and fashioned in such a manner as to possess the temper of the original alloy formula (Fig. 2). (See method of wrapping spring wire in Fig. 4.)

Buccal tubes and their alignment to produce intrusion or extrusion of anterior teeth have long constituted a separate and distinct art. The aforementioned experimentation arrived finally at the use of 3- to 6-inch lengths of chrome alloy tubing soldered to place and meeting anteriorly at the apex of a triangle or crossing one another, the top crossing tube exerting a minor pressure on the lower. Wires inserted into the cut-off tubes were found to be correctly parallel. This obviated the use of a soldering jig (Fig. 3).

In effecting the soldered joint, it was found that the best procedure was to:

1. Heat the molar band *very slightly.*
2. Apply chrome alloy flux liberally.
3. Flow 14-carat gold solder to the molar band.
4. Dip the end of the buccal tubing in anti-flux.
5. Heat the tubing at the area to be soldered *very slightly.*
6. Apply chrome alloy flux liberally.
7. Flow 14-carat gold solder on the buccal tubing at the designated spot.

8. Heat the molar band and, just before the solder flowed
9. Bring the buccal tubing into the flame.
10. When both soldered areas flowed, the soldering operation was effected simultaneously, aligning the tubing.

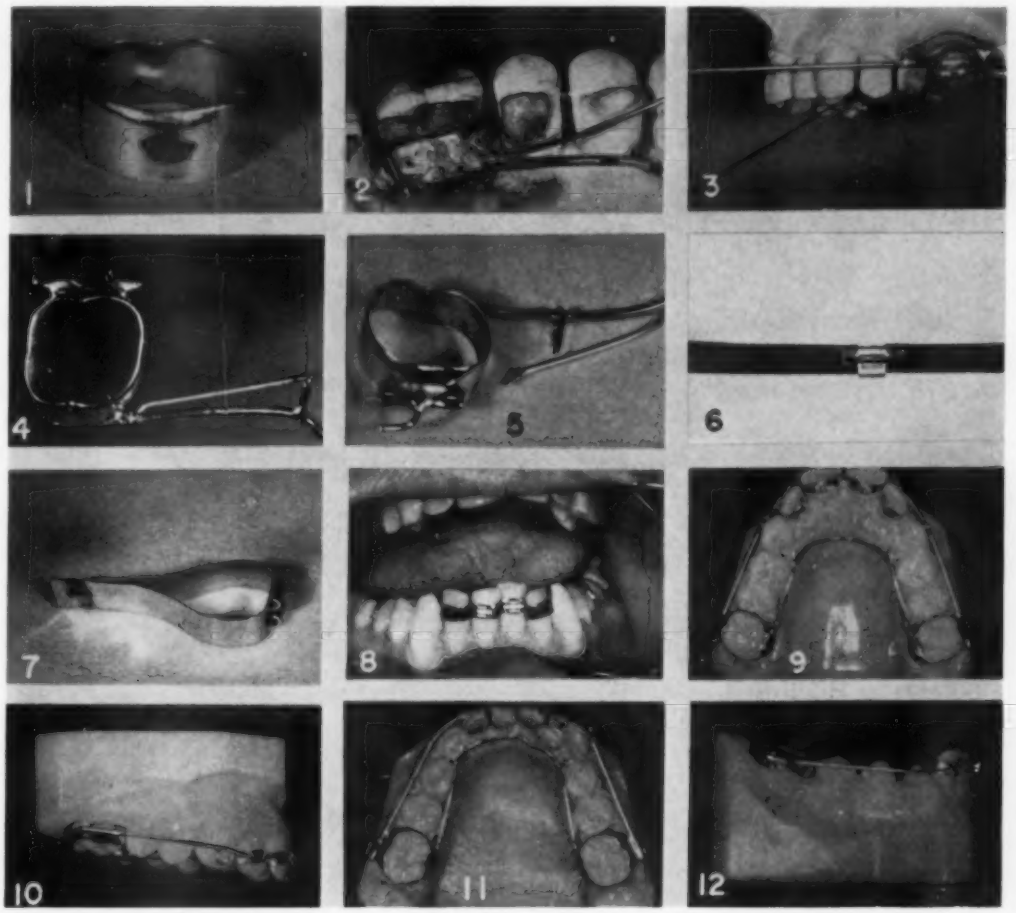

Fig. 1.—Preformed chrome alloy molar band.
Fig. 2.—Method of including auxiliary spring in soldered joint.
Fig. 3.—Length of chrome alloy buccal tubing soldered and aligned.
Fig. 4.—Wrapped auxiliary spring on lingual arch.
Fig. 5.—Auxiliary intermaxillary hook for ease in application of elastic.
Fig. 6.—Twin tie bracket spot welded to anterior band material.
Fig. 7.—Stock anterior band.
Fig. 8.—Mandibular anterior bands in position.
Fig. 9.—Palatal view of maxillary twin wire appliance.
Fig. 10.—Profile view of maxillary twin wire appliance showing how alignment of buccal tube affects position of labial twin wire arch, producing intrusive action on anterior teeth.
Fig. 11.—Occlusal view of mandibular twin wire appliance.
Fig. 12.—Profile view of mandibular twin wire appliance showing how alignment of buccal tubes affects position of labial twin wire arch, producing intrusive action on anterior teeth.

It was found that the combination of spot welding and soldering was well utilized in placing stops on the lingual arch, which also acted as "keepers" for the auxiliary springs.

After the soldering on a model was completed, the areas for attachment of stops were marked. The stop (usually .025 wire) was welded to place and then soldered with 14-carat solder (Fig. 4).

Very often, especially in the cases of mixed dentition, it was discovered that in order to prevent distal soft tissue impingement on the buccal tubes, it was necessary to trim them very short. Invariably, when Class II intermaxillary elastics were necessary, the appliance perforce had to be removed and hooks attached.

The technique evolved now includes the spot welding or "tacking" of a short segment of .025 wire to the buccal tubing before soldering to the band. This operation attaches the wire firmly enough that it will not become dislodged during any alignment procedure (Fig. 5).

Experimentation with anterior bands and attachments finally resulted in the following technique:

Technician-fabricated stock bands were made by cutting 1⅛ inch strips of 100 by .004 chrome band material, to the aligned center of each of which an .075 twin tie bracket was spot welded. The ends of the strip were then spot welded together, forming a loop (Figs. 6 and 7). The technique for application is the same as for many other anterior band adaptation techniques (Fig. 8).

The choice of the twin tie bracket is explained by the fact that adjustments of pressure may be made easily, plus the fact that there is less bulk to the bracket, especially when applied to convex and narrow anterior teeth. Complaints as to the time involved with ligating versus that with changing caps, etc., perhaps may be answered with the statement that with usage come proficiency and speed.

Always the goal of this experimentation with appliances has been to minimize the kinds of materials utilized, as well as to fabricate the best functioning breakage-free mechanism.

This work extended to such details as the soldering of hooks on end sections.

This technique evolved as follows: A 12 inch section of .035 (outside diameter) by .022 (inside diameter) tubing was marked at 1⅛ inch intervals. Immediately adjacent to each mark, a minute amount of 14-carat gold solder was flowed. An equally small amount of solder was flowed up on the end of an .025 chrome wire and held against the soldered area on the tube while being brought into the flame. After soldered union, the .025 wire was cut and the operation repeated on down the wire. After all soldered joints were effected, the tubing was cut at a point within 1 to 1.5 mm. of each wire.

The tubes were placed in the clip of the electrolytic polisher and subjected to its cleansing action before polishing and fashioning the hooks.

It is interesting to report that there has been next to no breakage or parting of the wire from the tube at the soldered joint.

In mentioning the use of the electrolytic polisher, it may be stated here that this valuable asset has been and is constantly, but judiciously, utilized in the cleansing of all appliances prior to finishing (Figs. 9, 10, 11 and 12).

Probably the best way in which to report on the effectiveness of this appliance is to present a series of case reports, which are now offered.

CASE REPORTS

CASE 1.—The patient was a 9-year-old white girl of Semitic ancestry.

Diagnosis.—Bilateral distoclusion with labioversion and infraversion of the maxillary central and lateral incisors (Class II, Division 1, Angle). There was an open bite and torsiversion of the maxillary lateral incisors.

History.—The patient was a life-long left thumb-sucker.

Etiology.—Thumb-sucking (left).

Appliances.—Modified twin wire with a maxillary filigreed palatal crib. Buccal tubes aligned to produce extrusion of maxillary anterior teeth. No mandibular anterior bands or labial arch were employed.

Progress of Case.—Appointments were met at three-week intervals. The habit was stopped immediately by the palatal crib. There was no psychological effect upon the patient.

At the end of three months, the infraverted maxillary incisors were corrected and Class II elastics were begun (2 to 3 ounces).

Elastics were continued full time for four months and half time for four months.

Length of active treatment was thirteen months.

Secondary (Retentive) Treatment.—A Hawley type appliance with .036 clasps was placed around the distal of first permanent molars to prevent interference with exfoliation and eruption. The Hawley appliance was worn full time for six months and half time for twelve months. The appliance was worn two nights weekly for six months and then was discarded.

Results Achieved.—Denture records reveal a normal, stable, functional, as well as anatomic, occlusion.

Posttreatment roentgenograms, taken four and one-half years after completion of treatment show normally developed teeth with no effect from therapy.

Facial records taken four and one-half years after treatment show a splendid, well-formed face. (Fig. 13.)

CASE 2.—The patient was a 10-year-old white boy of German ancestry.

Diagnosis.—Bilateral distoclusion, with linguoversion and supraversion of the maxillary central incisors, (Class II, Division 2, Angle).

History.—The patients' history revealed nothing of unusual significance. He had a typical Class II, Division 2 underdevelopment in the chin area immediately inferior to the lower lip.

Etiology.—Probably heredity.

Appliances.—Modified twin wire. Twin tie bracket bands on maxillary and mandibular incisors.

Progress of Treatment.—Appointments were met at three-week intervals. There was a management problem, with much appliance breakage and band loosening.

Three months after insertion of the appliance, Class II intermaxillaries were applied (2 to 3 ounces).

After three months of Class II traction, the lingual arch was removed and coil spring action on end tubes was instituted. (Five ounce elastics were used.) This was continued for seven months.

After this phase, the coil springs were removed and the labial arches were locked in the buccal tubes by crimping.

Class II intermaxillaries (2 to 3 ounces) again were applied for three months. After this time, the intermaxillaries were carried on half time for an additional three months and then were discontinued.

At the end of twenty months, active treatment ended.

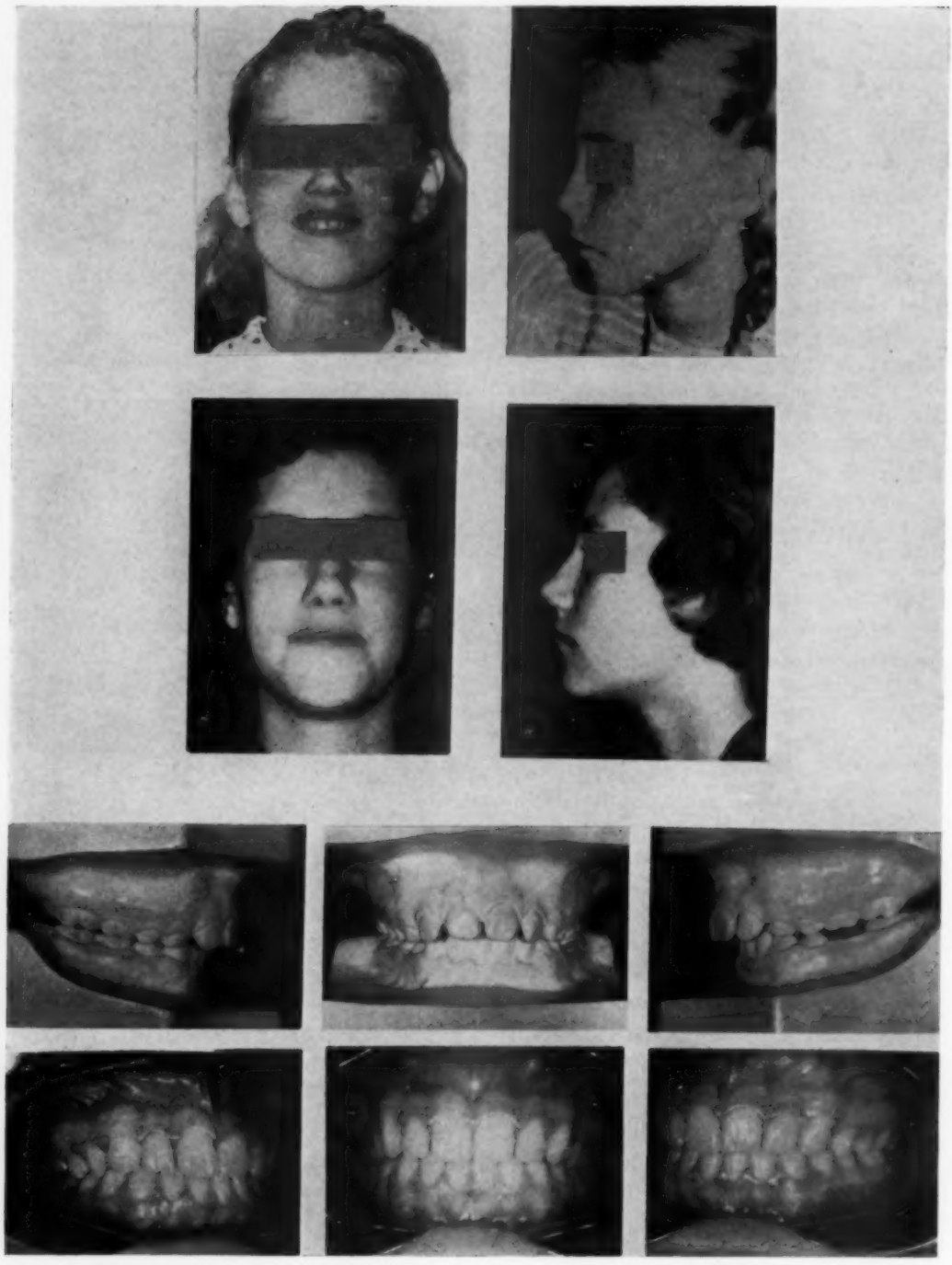

Fig. 13.—Case 1. Pretreatment and posttreatment facial and denture records.

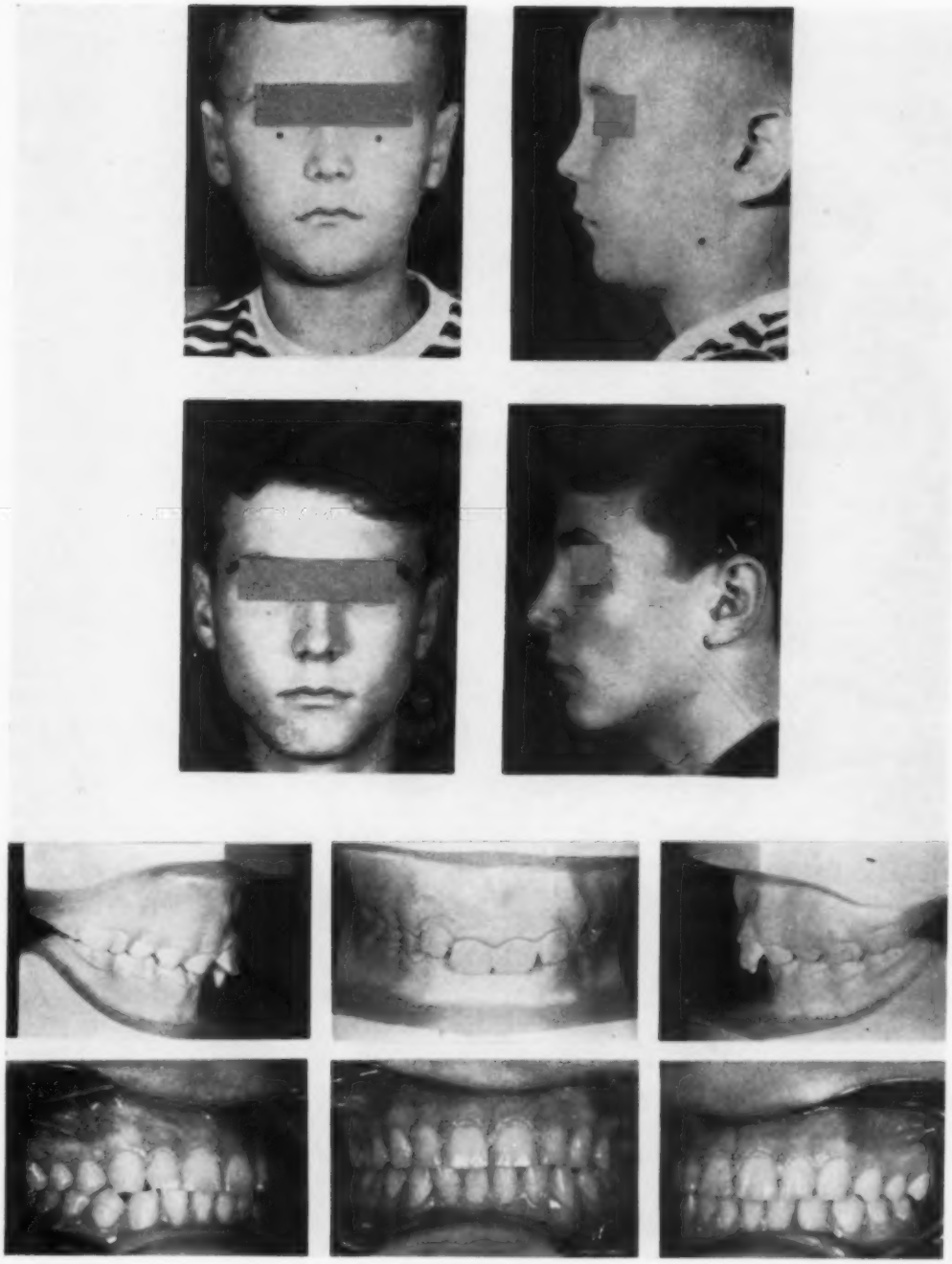

Fig. 14.—Case 2. Pretreatment and posttreatment facial and denture records.

Secondary Treatment.—

Maxillary arch: A Hawley type retainer was worn full time for six months and half time for one year.

Mandibular arch: A Hawley type retainer was worn full time for one year and half time for two years. This precaution was taken due to the large malposed mandibular third molars. Three years after active treatment these were removed.

Results Achieved.—It is my opinion that an acceptable, functional, near normal occlusion was attained.

Posttreatment roentgenograms, taken five years after completion of active treatment, show no damage from orthodontic therapy.

Denture records of the case show a well-retained result five years after completion of active treatment.

Facial records, five years after treatment, reveal an acceptable profile with a vestige of under-development of the chin. (Fig. 14.)

CASE 3.—The patient, a boy of Scottish ancestry, was 15 years old.

Diagnosis.—Unilateral distoclusion, left (Class II, Division 1, subdivision). There was an apparent mesioversion of the left maxillary segment.

History.—Nothing of significance was noted in the patient's history. He had no pressure or leaning habits. His facial features were underdeveloped and he had a moderately receded chin.

Etiology.—Unknown.

Appliances.—Primary maxillary appliances, fabricated directly. Seamless chrome alloy bands were fitted to the left maxillary first molar and first premolar. A round buccal tube wos soldered to the buccal of the molar band. An .075 twin tie bracket was welded to the buccal of the premolar band, care being taken to keep the channel of the bracket and the lumen of the molar buccal tube in direct horizontal alignment. An .036 chrome alloy wire was fitted into the channel and the buccal tube. Directly anterior to the twin tie bracket, the wire was curved downward at a 90 degree angle, and a hook was fashioned by bringing the wire directly upward again. Immediately anterior to the buccal tube, an .025 wire stop hook was soldered to the wire. The mandibular appliance was a closely fitted, soldered, lingual arch with .025 embrasure extentions fitted into the embrasures between the right and left first premolars and canines. The labial arch was .010 by .022 flat, ligated to lower anterior teeth.

Progress of Case.—Class II intermaxillary traction (2 to 3 ounce) was used on the left side for five months when the occlusion was normal.

A second maxillary appliance, a routine modified twin wire appliance, was then inserted.

Maxillary central and lateral incisors were banded, using .075 twin tie brackets.

Nine months of this phase produced the desired result.

Length of treatment was fourteen months.

Secondary (Retentive) Treatment.—Maxillary Hawley type retainer. No mandibular retention. Full-time retention for six months. Half-time retention for one year.

Results Achieved.—It is my opinion that a stable, functional and anatomic occlusion was established.

Denture records show a well-retained, normal occlusion three years after completion of active treatment.

Facial records, three years after treatment, show a well-developed face with a good chin and well-proportioned features. (Fig. 15.)

CASE 4.—The patient was a white man, 25 years of age, of Semitic ancestry.

Diagnosis.—Bilateral mesioclusion (Class III, Angle) with linguoversion of the maxillary central and lateral incisors.

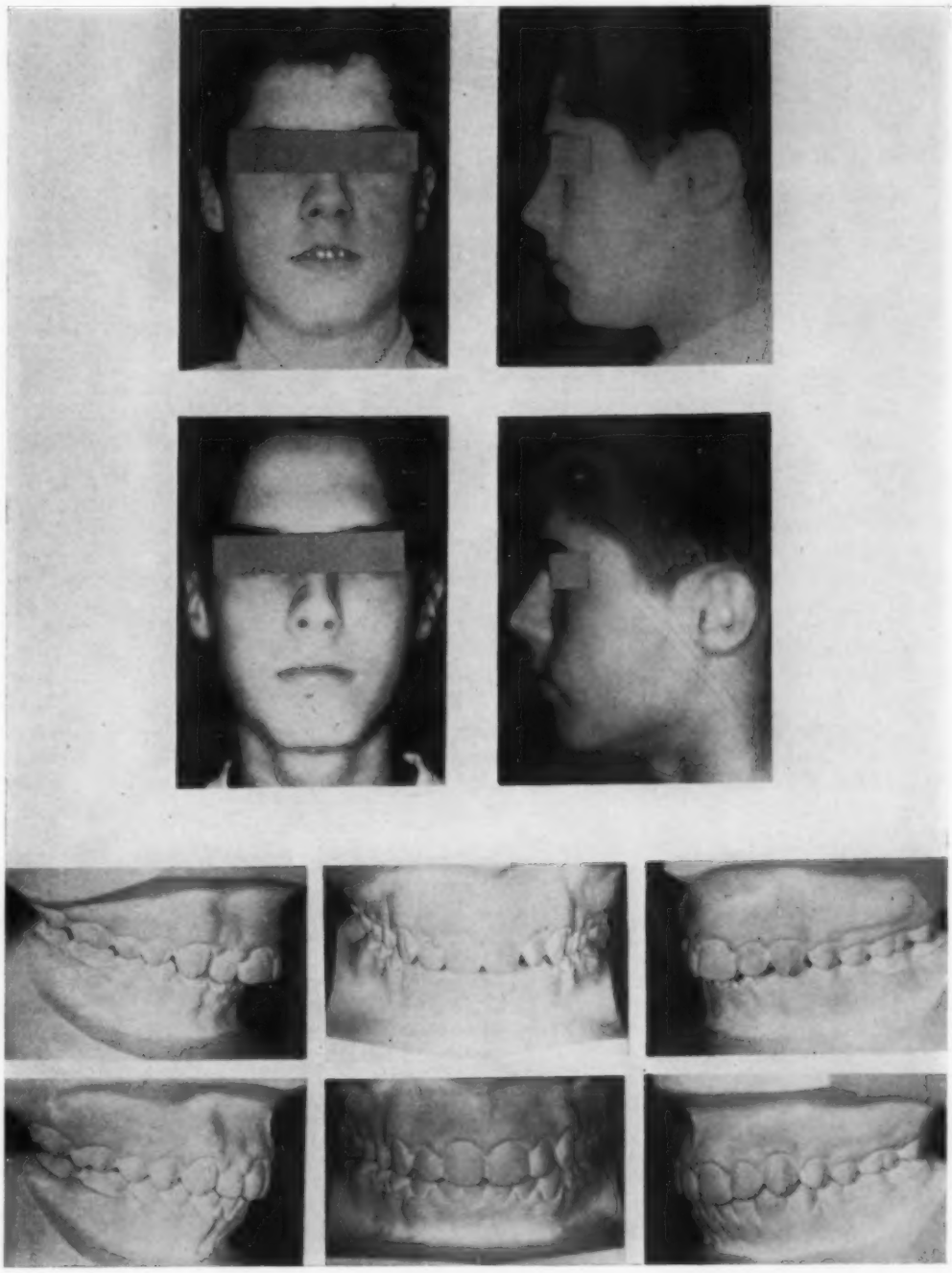

Fig. 15.—Case 3. Pretreatment and posttreatment facial and denture records.

History.—No habits or any history of like malocclusion in the patient's ancestry was found.

Facial features revealed pronounced mandibular prognathism.

Etiology.—Unknown. Possibly prolonged retention of primary maxillary central incisors with lingual eruption of permanent incisors.

Appliances.—

Mandibular appliance: Modified acrylic Hawley type appliance with bite plane.

Maxillary appliance: Modified twin wire. Buccal tubes aligned to produce extrusion of maxillary anteriors.

Progress of Case.—The mandibular appliance was worn for a period of three months, tipping the maxillary incisors until they were edge to edge with the mandibular incisors.

It was then evident that the bite would be opened if the maxillary incisors were not extruded. Therefore, the maxillary appliance was inserted and the mandibular appliance was discarded.

After six months, the occlusion was established within normal limits, and the maxillary incisors were locked in position labial to the mandibular incisors.

The length of active treatment was nine months.

Secondary (Retentive) Treatment.—None.

Results Achieved.—Good, stable, functional, if not anatomic, occlusion was established.

Posttreatment roentgenograms show no effect from orthodontic therapy.

Denture records show a well-retained functional occlusion two and one-half years after completion of active treatment.

Facial records two years after completion of active treatment show a spectacular improvement—well worth the institution of treatment, as the patient was entering dentistry. (Fig. 16.)

CASE 5.—The patient was a 15-year-old white boy of English ancestry.

Diagnosis.—Bilateral distoclusion with labioversion of the upper central and lateral incisors (Class II, Division 1, Angle).

There was an idiopathic hypertrophy of the gingival area which obscured all but the incisal and occlusal third of the teeth. The canines were unerupted as a result of this tissue. The left mandibular premolars were completely out of occlusion, lingual to the maxillary.

There was a deep overbite.

History.—The patient had been examined at length in two large hospitals, with no positive findings reported.

There was no history of illness other than ordinary childhood diseases. There was no history of epilepsy.

The heavy features, linked with the presence of the extreme amount of hard, nonirritated gingival tissue, were indicative of a ductless gland disorder. However, a complete physical examination and endocrine work-up showed negatively.

Etiology.—Unknown.

Appliances.—Maxillary and mandibular modified twin wire appliances.

An .020 auxiliary spring was soldered to the mandibular arch and adjusted against the lingual of the left mandibular premolars to secure buccal movement.

Maxillary and mandibular anterior teeth were banded, using .075 twin tie bracket bands.

Progress of Case.—The hypertrophied gingival tissue was removed by quadrants, with approximately four weeks elapsing between operations.

Healing was splendid and, three months after the final operation, the appliances were inserted.

After three months, Class II intermaxillary traction (2 to 3 ounces) was begun.

Response to treatment was exceptionally good, in spite of frequent appliance breakage.

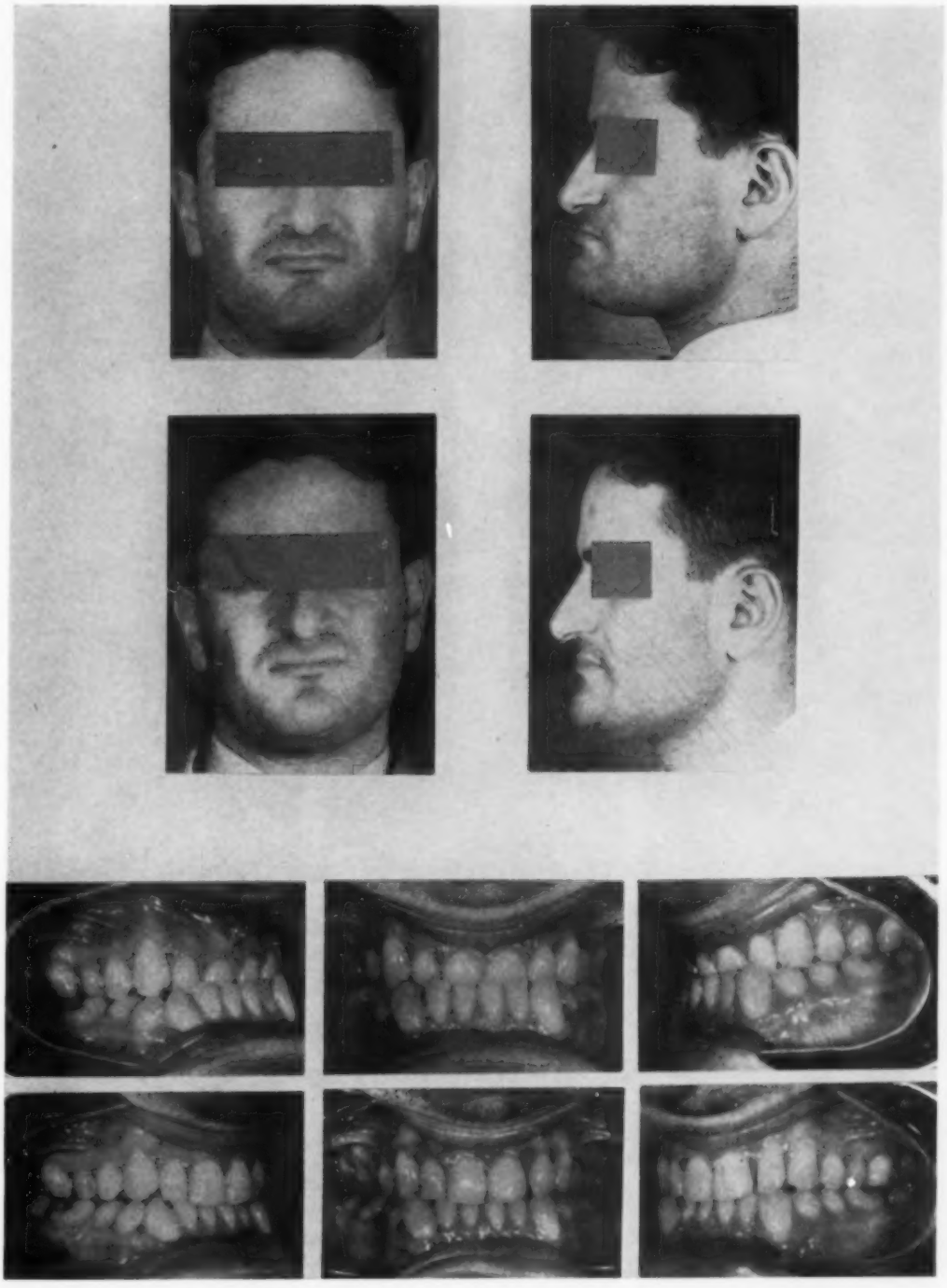

Fig. 16.—Case 4. Pretreatment and posttreatment facial and denture records.

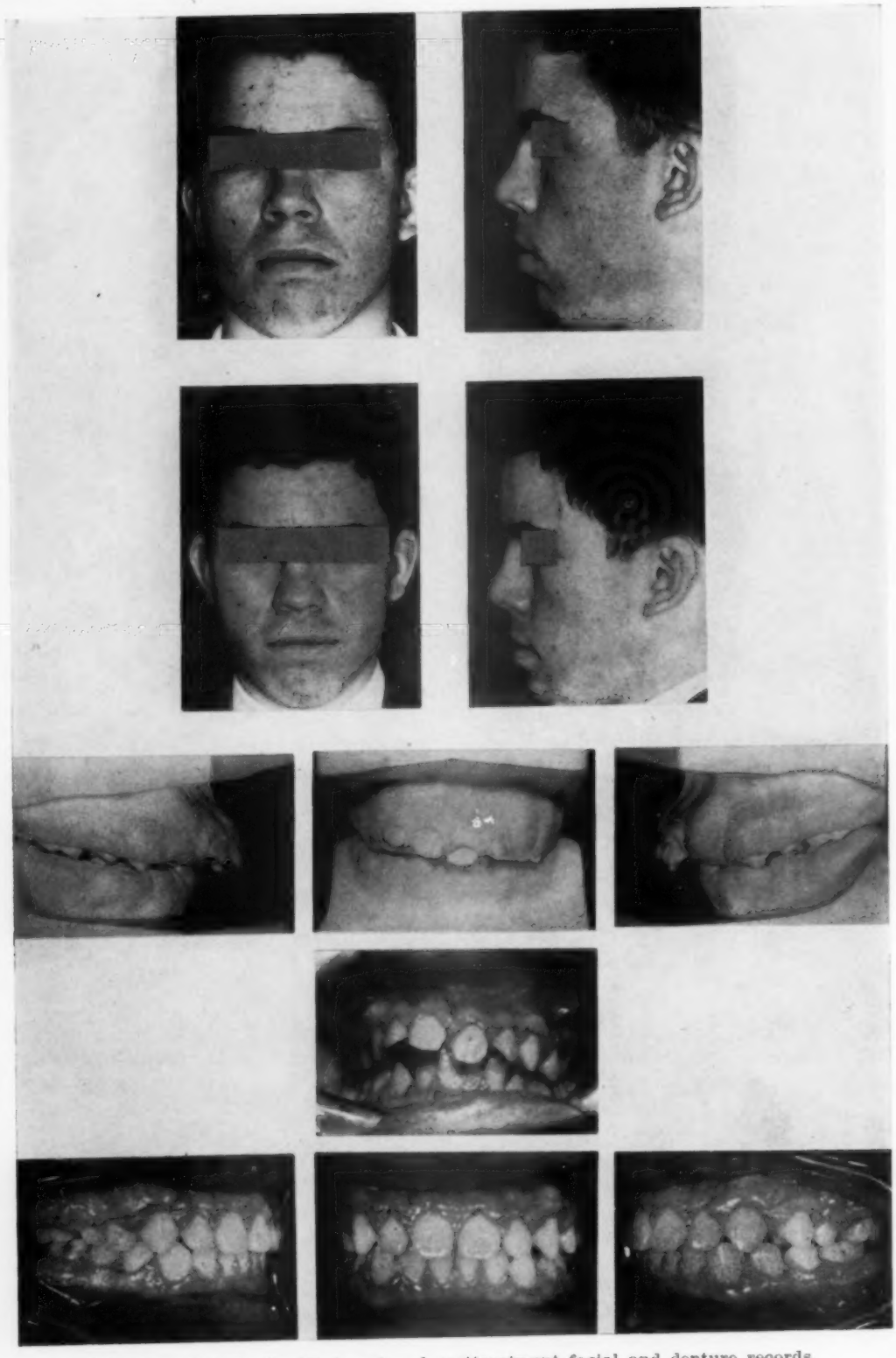

Fig. 17.—Case 5. Pretreatment and posttreatment facial and denture records.

At the end of seven months' treatment, the periodontist removed superfluous tissue from the labial and lingual areas of the maxillary anterior region. This was the result of alignment and closure of the diastemata.

At the end of eleven months' treatment, superfluous tissue was removed from both maxillary and mandibular anterior regions.

At this time, the twin wire labials were replaced by flat .010 by .022 mid-section arches. Class II elastic traction was continued half time for the next three months.

Active treatment time was twenty-three months.

Secondary (Retentive) Treatment.—Maxillary and mandibular removable Hawley type retainers were utilized full time for one year, half time for one year, and then discarded.

Results Achieved.—It is my opinion that a good, stable, functional, if not truly anatomic, occlusion was established.

There has been no recurrence of gingival hypertrophy four and one-half years after the completion of the case. This is contrary to many warnings received before attempting treatment.

Without benefit of treatment, I am certain, this young man would have been placed in a "freak" category.

Denture records show a well-retained functional, if not anatomic occlusion, four and one-half years after completion of active treatment.

Facial records of the patient show a slight development of the chin through treatment. It is strange to observe the lack of facial imbalance in the pre-treatment photographs.

If the records, both facial and denture after treatment, reveal a tendency toward a bimaxillary protrustion, one need but realize how complex was the problem. The condition of the tissues in no way was conducive to the removal of dental units in order to alleviate the condition. (Fig. 17.)

8230 Forsyth Blvd.

THE ROLE OF UPPER SECOND MOLAR EXTRACTION IN ORTHODONTIC TREATMENT

A Case Report

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THE question of extraction as an adjunct in orthodontic therapy no longer engenders controversy in orthodontic circles. There are few men in practice who do not see the need for sacrifice of teeth at one time or another. The controversy that now exists is not "to be or not to be," but "when and what." Strong cases are presented in certain quarters for the routine extraction of four first premolars. Thoughtful students of physiology, however, are likely to raise an eyebrow at any procedure that is routine when it comes to the manipulation of teeth or any other part of the human body. Despite our constant efforts to develop hard and fast rules, to eliminate variables, and to channelize our therapy, we fail just when we least expect it. As for the 100 percenters, there is this to say, paraphrasing a well-known quotation: If a man is right 50 per cent of the time, that is fine and as it should be; if he is right 65 per cent of the time, he ought to thank the Lord and congratulate himself; if he is right 75 per cent of the time, that is cause for suspicion. But what of the man who is right 100 per cent of the time? He is a knave, a fool, a rake, a rogue, and a zealot (or an orthodontist who straightens teeth by word of mouth)! Competent clinicians now realize that no tooth is sacrosanct anymore. During the course of treatment, at one time or another, it may be feasible to sacrifice first premolars, second premolars, lower incisors, second molars or third molars. Even the mighty canine at times must bow to the inevitable when a combination of factors indicates that its sacrifice will mean a less traumatic therapy and a more stable result.

This article deals particularly with the general principles governing the extraction of maxillary second molars. This is not a new procedure at all. Many orthodontists have removed maxillary second molars in selected cases for a long time. But removal of any teeth, be they second molars, second premolars, or first premolars, requires a fundamental consideration—that restoration of normal maxillomandibular tooth relationship must be done primarily by adjusting the maxillary arch to the mandibular arch in Class II cases. This means a distal movement of the denture en masse, or of parts of the

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denture, with normal overbite and overjet the goal. It has become increasingly apparent to me in Class II therapy that the posterior movement of the maxillary base itself is practically nil. Primarily, the basal effect is to withhold the maxillary denture base from its normal downward and forward progression. This, plus the adjustment that comes from distal movement, or distal tipping of teeth, in conjunction with mandibular growth, provides the anteroposterior correction. The percentage contribution of each factor depends on such considerations as age, sex, severity of the problem, endocrine balance, appliance therapy, etc. The interdependence of these factors and many others is so complex as to make any prediction of the exact role of any factor relatively inaccurate. Where the percentage contribution of distal movement of the teeth themselves must be appreciable, it cannot be accomplished without creating space for that movement. There is only a limited amount of space available in the alveolar trough. When this is gained, further efforts either force individual dental units buccally or lingually, or impact the unerupted second or third molars by excessive tipping of the contiguous tooth. While it is my opinion that *entirely too much stress has been placed on a Class I buccal segment relationship, regardless of the degree of apical base dysplasia*, and while Angle's ideal occlusion often has been the

Fig. 1.—Patient J. M. Note strong convexity of profile and the hyperactive mentalis muscle function when the lips are closed.

proverbial "pot of gold at the end of the rainbow," to the detriment of the health and stability of the teeth and investing tissues, it must be stressed that "Old Glory," if attainable, must be the goal. It is felt that removal of maxillary second molars can be a decided step in that direction in certain Class II malocclusions.

Patient J. M., aged 9 years, shows such a case over a span of six and one-half years, from pretreatment to almost five years out of retention (Fig. 1). The initial problem was a severe Class II, Division 1 malocclusion (Fig. 2).

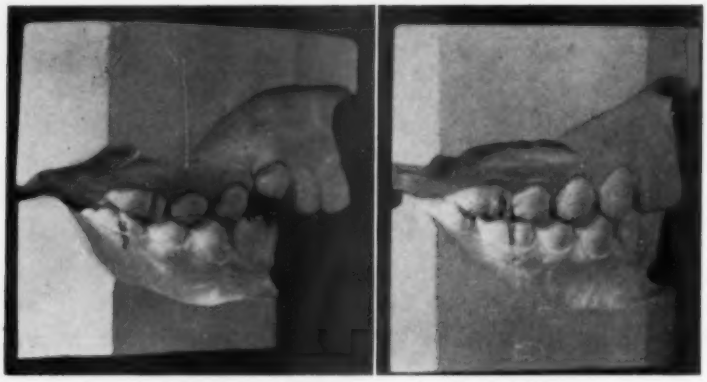

Fig. 2.—Plaster casts, showing the original severe Class II, Division I malocclusion with a marked overjet but without excessive overbite, and models taken two-and-one-half years after active treatment, showing the elimination of Class II sequelae.

Fig. 3.

Fig. 4.

Fig. 3.—Lateral cephalometric radiograph. The full complement of teeth is present, with all deciduous teeth replaced well in advance of the usual age for tooth exchange. The antero-posterior apical base discrepancy is marked.

Fig. 4.—Lateral cephalometric radiograph, two years after the removal of all appliances. Maxillary third molars have come forward and are erupting normally.

Cephalometric headplates showed a normal path of closure, no displacement, and a severe anteroposterior apical base difference (Fig. 3). Because the lower arch was apparently normal and in balance, appliance therapy was directed solely against the maxilla with extraoral force. A year of treatment and the precocious eruption of the maxillary second molars still left much to be obtained. The maxillary second molars were removed. There was a rapid speed-up in anteroposterior adjustment, with the removal of appliances after a total of twenty-three months, when the patient was 11 years

Fig. 5.—There has been great improvement in the profile outline. Normal lip posture and function have been established to assist in maintaining a stable result.

Fig. 6.—Plaster casts taken almost five years after all appliances have been removed. Maxillary third molars are in place and functioning.

of age. A Hawley type retainer was placed but not worn, so that there was never a true retention period. Casts taken two years later, however, showed an apparently stable result (Fig. 2). Cephalometric headplates (Fig. 4) showed a retropositioning of the maxillary teeth, with maxillary third molars erupting normally. A cephalometric analysis of the before and after headplates substantiated the clinical impression, with a 4.5 degree reduction in

apical base difference. The mandibular arch remained unchanged after a four-year span. Facial esthetics, however, changed greatly (Fig. 5). The patient was brought back for records two and one-half years later and the treatment results remain stable (Fig. 6). Maxillary third molars are now in place. Covering this span of more than six years, the cephalometric tracings tell the story. The initial severe problem was corrected in two years and remained stable, as subsequent examinations and records indicate. A composite of the six-year span graphically portrays the basal adjustment, tooth movement, and mandibular growth increments (Fig. 7).

Fig. 7.—Composite tracings before treatment and almost seven years later. The maxillary denture has descended vertically, with the incisors in a more retruded position than before treatment was instituted. The mandibular teeth and supporting bone have moved downward and forward significantly during this time.

An analysis of the results indicates two criteria of first importance when considering the sacrifice of maxillary second molars: first, an excessive labial axial inclination of the maxillary incisors, with no spacing present in this case; second, the patient had a neutral or even negative overbite. Marked lingual tipping of the maxillary incisors during orthodontic treatment did not produce too severe a lingual inclination, which would only relapse when restraining appliances were removed. The lingual tipping, which increases overbite, did so safely because the overbite was not excessive in the beginning, as it usually is in most Class II, Division 1 cases. To these two characteristics must be added the obvious observation that maxillary third molars were present and reasonably normal in shape and position. This must be checked carefully for any case before making a decision on sacrifice of maxillary second molars. All growth contributions were utilized and would be helpful in any similar case. As a rule, it is sound clinical judgment to beware of those cases where the basal difference is severe, overbite and overjet are marked,

and upper incisors are erect with no spacing. Good growth increments during treatment, however, can reduce the hazards of excessive lingual tipping of the maxillary incisors and help eliminate the vertical discrepancies.

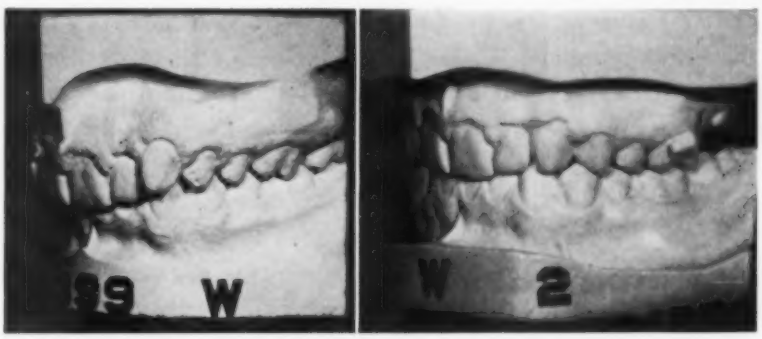

Fig. 8.—Extraoral force and a bite plate provided the sole orthodontic assistance. The time interval between sets of casts is eight months.

A case in point is seen in Fig. 8, where the initial full Class II relationship on the left side was coupled with mandibular overclosure—excessive overbite—but with a relatively normal overjet. The removal of the maxillary second molars and eight months of wearing a maxillary labial arch wire activated by an extraoral appliance, plus a bite plate, produced the results illustrated. There was an obvious major assist from growth. Note that the third molars are erupting in a mesiovertical direction with space still left to the mesial. The results were stable.

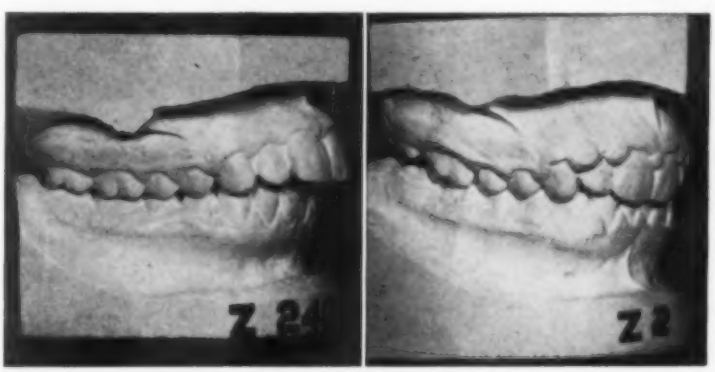

Fig. 9.—Patient C. P. Plaster casts before and after treatment. The maxillary third molars are erupting forward into proper occlusion. Tissue hypertrophy is considerable, despite the simplicity of the appliance and short duration of treatment.

Growth is not always necessary if the difference can be made up by distal movement of the maxillary teeth. Patient 240 (Fig. 9) was a young adult with a full Class II relationship, with a strong predilection to gingival disturbances, and with second molars in place and in function. Second molars were removed in the maxillary arch and a labial arch wire and two first molar bands were placed, activated by extraoral force. Despite the simplicity of

the appliance, gingival hypertrophy was considerable. No growth occurred, and correction was gained by distal movement of the maxillary teeth. The resultant excessive lingual inclination of the maxillary incisors would not have been necessary if mandibular growth had occurred. Cephalometric headplates at the beginning of treatment showed a prognathic denture and excessive apical base discrepancy. Under the influence of the maxillary appliance, both upper and lower incisors were uprighted at retention time and have remained that way since. The composite tracing (Fig. 10) points to the maxillary tooth movement as the major change and as the basis for the correction of the malocclusion.

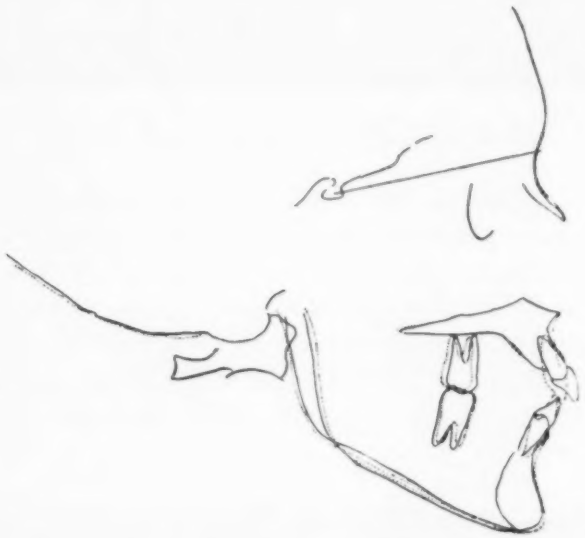

Fig. 10.—Composite cephalometric tracing shows practically no growth changes over the entire period of orthodontic management. (Patient C. P.)

Summarizing our observations, I think the following salient points can be made:

1. Granting the need for tooth sacrifice in certain cases, the infinite variability of form and function and the multiplicity of factors operating at any one time mitigate against the routine extraction of the first premolars in orthodontic therapy.

2. In Class II treatment, the greatest change produced by orthodontic appliances is in the maxilla. Distal adjustment of tooth position in the maxilla alone, or in conjunction with mandibular growth, is the basis for correction of the malocclusion. Because of the unpredictability of growth, a major consideration is securing adequate space in the alveolar trough for the required tooth adjustment. If the space is gained in the second molar area, only as much space as is required need be used, with the subsequent mesiovertical eruption of the maxillary third molars filling the gap. Space closure often is not as easy where first premolars have been removed.

3. Recognizing the maxilla as the major area of adjustment in Class II cases, confining therapeutic measures largely to this arch reduces the appliance complexity and tissue trauma.

4. Maxillary second molar removal expedites correction of Class II, Division 1 malocclusions, provided that (a) there is excessive labial inclination of the maxillary incisors, with no spacing; (b) overbite is minimal; and (c) third molars are present in the maxilla, in good position and of proper shape.

5. Growth increments during therapy reduce requirements for distal movement of the maxillary denture; however, even where growth ceases to be a factor, marked adjustment of maxillary teeth can be gained using the maxillary second molar space.

6. The cases offering the poorest prognosis for maxillary second molar extraction are severe basal dysplasias with vertically inclined maxillary incisors, no spacing, and severe overbite. Good growth increments can improve the prognosis here, however.

450 Green Bay Rd.

APPLYING THE CLINICAL YARDSTICK TO SOME CURRENT ORTHODONTIC CONCEPTS

BERCU FISCHER, D.D.S., NEW YORK, N. Y.

My business is to teach my aspirations to conform themselves to fact, not to try to make facts harmonize with my aspirations. Sit down before fact as a little child, be prepared to give up every preconceived notion, follow humbly wherever Nature leads or you will learn nothing.—*Thomas Huxley.*

INTRODUCTION

ALL biologic knowledge consists of two parts. One is the aggregate of experimental observations and thinking derived from biologic experiments; the other is the language used to communicate these activities. This growth process of knowledge is common to all biologic disciplines to which the orthodontic specialty belongs and is a most useful means for sharing and advancing such knowledge.

A glance at the growth of biologic knowledge is sufficient to show that each of these divisions can get out of hand and hinder progress. Turning to the orthodontic field, accumulated clinical experience very often outstrips current usage of the language, making it difficult for the orthodontist to say clearly what he means. While this does not affect his doings, it does slow down exchange of ideas. At other times the language outstrips clinical practice. Serious confusion may result if this gets out of hand.

Time will not permit us to give a full account of the periods of divergence and convergance of these two divisions of knowledge in orthodontic history. However, since this article is about orthodontic concepts, it is important to point out a few fundamental data. When the field of the orthodontist was restricted to the teeth, the problem of bringing the orthodontic language in line with orthodontic experience was relatively simple. Angle's classification of malocclusion may be considered as marking the end of this period. Fascinated by its simplicity but overlooking its limitations, orthodontists accepted it as a basis for diagnosis and treatment. Thus, a classification useful for assorting certain observations has been extended as a schema for general clinical practice.

Orthodontic literature shows that one of the main activities in orthodontic methodology of the period during and after Angle centered around the

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formulation of a normal standard that would replace Angle's concept of "normal occlusion." Of the standards offered as substitutes, some were formulated on the basis of anatomic parts or landmarks other than the teeth, such as the key ridge. Others were derived statistically from data obtained from so-called "normal" individuals, that is, norms based upon anatomic landmarks, such as the "canine law" of Simon. The most important single observation about these substitute methods of diagnosis is in their relation to treatment. While they were developed because of dissatisfaction with Angle's diagnosis, they produced no appreciable change in his methods of treatment. The basic orthodontic tooth movement—en masse movement—remained unchanged.

The name of Calvin S. Case comes to mind as the outstanding opponent to Angle's concept. Angle had established the full complement of teeth as one of the basic principles of practice. This was inviolable and carried with it the injunction, "Thou shalt not extract!" Case advocated extraction of teeth in the treatment of some patients; and in this controversy, as so often happens, the established practice carried moral weight and won. The organized profession and public opinion then did the rest by compelling the ranks to fall in line. Thus, Case's teachings soon were brushed aside, removing the only important obstacle to the perpetuation of the Angle concept.

Some of you may recall a repetition of this controversy when Paul Simon of Germany advocated the extraction of maxillary first premolars in the treatment of Class II, Division 1 (Angle) malocclusions. Since biometric norms are still with us today, it would seem, in retrospect, that the investigations which finally, and for good reasons, invalidated Simon's "canine law" were motivated more by a desire to counteract extraction than to assess his method of diagnosis.

With the full complement of teeth dominating clinical practice, orthodontic failures led to two important consequences. The first was the increasing interest that the orthodontist showed in the disturbing effect of orthodontic tooth movement upon contiguous facial structures. The second was his concern over the instability of the teeth after treatment due to the action of these same contiguous parts. As the activities of the orthodontist were thus extended, first to the dental arches, then to the tissues immediately surrounding them, and finally to more remote structures, the problem of equating orthodontic reality with Angle's orthodontic concept became progressively more difficult.

Our attention turns to the various appliances developed by Angle for the purpose of correcting the disparity between his theory and practice, ending in the presentation to the profession in 1929 of his "latest and best orthodontic appliance—the edgewise."

About this time, Charles H. Tweed revived the issue of extraction and in 1936 published some creditable results obtained in cases in which he extracted teeth. The human mind, naturally given to rationalization, does not permit work to continue for any length of time before concepts begin to make their

way into this rationalization. It was such concepts as facial esthetics as a standard of normality, the position of the mandibular incisors, intraoral stationary anchorage, and the tooth movement claimed by Tweed's method that orthodontists soon began to question.

THE PROBLEM

To bring this parallel review of orthodontic concepts and clinical reality up to date, we may note the following: (1) While extraction of teeth in orthodontic treatment is generally accepted, it is still under the effect of Angle's injunction in some quarters of the profession. It is difficult to understand why resection of the mandible for the benefit of the patient is considered good orthodontic practice, while extraction of teeth for the same purpose is not. (2) Orthodontic literature is replete with concepts such as theories, hypotheses, philosophies, etc., which are still waiting to be equated with clinical reality. To this must be added (3) the influx, into the language of the orthodontist, of terms and statements from collateral disciplines such as anthropology, genetics, endocrinology, etc. These collateral disciplines have not yet equated these terms with their own reality. (4) Orthodontic diagnosis has drifted further and further away from treatment and has continued its own development without the benefit of clinical verification. Having been brought up on an unjustified optimism that anything desirable in clinical orthodontics is also attainable, we have allowed the simplicity of techniques employed in formulating standards of "norms" to transcend the complexities involved in their application to the individual patient.

Surrounded by such a mass of conjectural and unsettled opinions, the clinician is bewildered as he tries to apply some of these in his daily practice. They invariably lead to the formulation of indiscreet objectives of treatment which are unattainable with available orthodontic means.

In presenting this sketchy outline of the orthodontic scene, it is not my intention to belittle valuable contributions to our knowledge. Without these, progress could not have been possible. On the contrary, it is concern for the loss of valuable clinical experience in what might be called the "battle of the concepts" which prompted this presentation. The most disturbing result of periods in which concepts get out of hand is the division of professional ranks into groups siding with and defending the totality of pet concepts. It is not the defense of valuable clinical reality contained in a new concept that is objectionable, but the defense of its totality and its panacean claims which crowd out some well-established and experimentally verified practices. Such a situation not only hinders progress, but shakes the confidence of the clinician in his own work by placing him in a defensive position and very often causing him to discard valuable knowledge. The only reason for bringing these observations to your attention is the desire to share with you my conviction that a good deal of the misunderstanding and confusion today, as in the past, has been due to the disparity between what we do and what we say in orthodontics, and to suggest a solution.

In spite of the complexity of the problem which confronts us, its overwhelming importance warrants our analyzing it as objectively as possible in order to understand something about the following of its aspects:

(1) The origin of orthodontic concepts.

(2) The conditions which contribute to their separation from clinical reality.

(3) How to prevent concepts from getting out of hand.

(4) How to distinguish between real and unreal orthodontic concepts.

Origin of Orthodontic Concepts.—The orthodontist creates his own little universe, within which his orthodontic activities lead him to discover certain facts and phenomena. His mind is on the constant lookout for concepts to generalize and pattern these discoveries. Such patterning is encouraged by the ability of the human mind to find or establish relationships between things and phenomena, even when such relationships may not be Nature's intention. Thus, the orthodontist postulates such concepts as classifications, hypotheses, definitions, philosophies, etc., and here is where the trouble begins.

There are a number of conditions which make it possible for concepts to get out of hand. Some of these are inherent in the nature of concepts; others have their basis in the human element; still others originate in the structure of language. Conditions from these sources combine to becloud and obscure the basic facts underlying the concepts and are mostly responsible for concepts getting out of hand.

How Concepts Get Out of Hand.—Let us analyze for a moment how a concept drifts away from its frame of reference. By "frame of reference" we mean simply a set of observations with reference to which the concept is defined. The orthodontist employs the term "dentofacial complex" to designate the biologic field in which he works. When he uses this term, which sounds all-inclusive (and it is), does he really see and know the whole complex? The truth of the matter is that the orthodontist becomes acquainted only with certain fragments of his biologic field, at best coming in contact with only a limited number of relationships between the anatomic parts of the dentofacial complex and their functional activities.

If such a loose collection of fragments is considered the whole frame of reference, no harm need result from having a concept. The important thing to remember is that the concept and the term used to designate it were formulated upon relationships and phenomena discovered in the particular field of operations and applies only to them. The word "concept," however, is not always associated with such a modest claim. Very often it is used with reference to the whole biologic complex to which the isolated fragments belong; and the fact that it was only these fragments upon which the concept was originally formulated is forgotten.

This can be made clear by an illustration. Take Angle's definition of Class II, Division 1 malocclusion. Two traits—the molar relationship and the

anterior overjet—are the only criteria upon which the definition was formulated. If Angle had limited his concept and term of this class to cases with regular dental arches and the typical Class II molar relationship and overjet, he would have confined the concept to the original frame of reference and everything would have been clear. But difficulties and confusion developed because the term was employed to include traits which were not covered by the original frame of reference.

This tendency, when making statements, of extending the meaning of terms beyond their frame of reference and making them all-inclusive contributes greatly to the unreality of concepts.

Contributing to this tendency to generalize is a human element known as "wishful thinking" which allows concepts to influence objectivity of judgment. Unless continually checked against clinical findings, "wishful thinking" is likely to start unconsciously.

Nature and Biologic Concepts.—Another factor contributing to the divergence between concepts and clinical reality is the relationship between Nature and biologic concepts. Due to the structure of some biologic terms, their use implies a partnership with Nature in experimental activities which are man's alone. Take, for instance, the term "normal." All standards of normality used by orthodontists imply their being a part of Nature's plan for the person to whom they are applied, an assumption having no foundation in fact. This assumption originates in the belief that what is desirable is synonymous with "normal." Nature's resistance to some orthodontic operations shows that she neither asks for nor always approves of them. The orthodontist very often is bogged down by Nature in his work until he discovers her interferences and his own limitations. *By recognizing these limitations, the clinician can very often enlist Nature's assistance in the attainment of what is desirable. This is the "achievable optimum in treatment."*

Let me clear up another point about this relationship between Nature and biologic concepts. The various schematizing methods of diagnosis employ standards which are derived statistically from measurements taken upon samples of so-called "normal" individuals. These biometric norms differ only in the criteria which dictate the choice of dental, facial, and cranial landmarks used in obtaining their measurements and in the form of their final yardstick. Statistical yardsticks or standards may take the form of tables, graphs, lines, angles, diagrams, wiggles, etc.

On first acquaintance with these various methods, one gets the feeling of having come upon some very valuable practical guides to treatment, and every one of these standards seems right. This first impression is not at all surprising, since the various standards are correct with respect to the set of observations with reference to which they were defined. However, confusion follows when objectives of treatment for a particular individual are formulated upon such standards. The standards become clinically meaningless for a number of reasons, two of which are relevant to this discussion. First, the parts of the individual to which the standard is applied have in common with

the parts of the constructed artificial model or standard only the names. One is living tissue; the other is inanimate. Second, due to natural variation, symmetry between the component parts of complex organs is practically nonexistent; asymmetry is the rule. The various natural asymmetries are greatly responsible for the individuality of each dentofacial complex, are usually bilateral, and can be diagnosed only by comparing right and left homologous parts of the same individual. Because of the mode in which it is constructed, the biometric norm has already leveled off without benefit of treatment many of the asymmetries which were present in the individuals of the sample and presents now a meaningless model for their diagnosis.

The unreality of these schematizing methods of diagnosis which dominate the orthodontic scene today is further seen clearly in the following instance. Dental and facial esthetics, which play such an important part in formulating objectives of orthodontic treatment, necessarily influence the choice of the prototype and statistical sample upon which the biometric norm is constructed. If we stop to consider that Nature produces correct occlusions in people of all types and races, we must conclude that an esthetic effect, unlike function, is not one of Nature's objectives. While it is easy to admit that an esthetic sense is inherent in man, it must be recognized that its concrete expressions are not biologic manifestations, but are cultural and anthropologic. These expressions differ with various cultures and races, various localities, and historic periods of man. A bimaxillary protrusion, protraction, or prognathism (different terms meaning the same thing) is a natural trait, and may even be a criterion of beauty in some ethnic groups in this country. When the same trait occurs in an individual of another ethnic group, according to some schools of thought, it calls for orthodontic interference even when the occlusion is correct. How can anyone be justified in claiming Nature as a partner in such activity? It is obvious that there is no relationship between Nature and these concepts.

So we see that, once something is isolated from a biologic whole, it can be examined and considered by itself from different points of view and conclusions can be drawn which seem logical in an abstract exposition, forgetting that what we are examining and studying is not the living complex organ of the individual. This difference between individuals, between biometric norms and the individual, between norms of various groups or samples (in other words, this individuality of biologic organs, despite their basic common pattern) invalidates schematizing methods of diagnosis as a basis for orthodontic changes in the individual.

What has been said is sufficient to show that intuition and imagination enable the human mind to formulate concepts. "Wishful thinking" and personal bias may, through language, build logical structures that have no biologic foundation and no clinical justification. Under the circumstances, it is obvious that, if we are to avoid confusion, it is necessary to check any advance in concepts against clinical reality. The situation points clearly to the

need for guiding principles which will enable the clinician to distinguish between real and unreal concepts. Such guiding principles are made available by the *scientific method.*

SCIENTIFIC METHOD IN CLINICAL PRACTICE

A complete discussion of the techniques employed in the application of this method to clinical orthodontics is not here intended. A detailed analysis of it will continue to be made available in my writings.[1] I do wish, however, to leave for your consideration some of the guiding principles which have developed from the application of the scientific method in my practice. The first group of principles refers to the relationship between the clinician and Nature as it applies specifically to the orthodontist. The second group of principles forms a yardstick which is helpful in differentiating between what is useful and what is worthless for the clinician in general.

I stated earlier that, by recognizing Nature's interferences and by discovering his own limitations, the orthodontist very often can enlist Nature's assistance in the attainment of what is desirable. Since all natural interferences necessitate some form of compromise for their solution, I deem it necessary to make my own position clear on some aspects of practice relevant to the relationship between the orthodontist and Nature.

In any compromise with natural conditions that interfere with my attainment of a correct functional intercuspation between the maxillary and mandibular teeth, the following are the remedial steps for nonextraction, as well as for extraction, cases.

1. Never compromise the correct relationship between the maxillary and mandibular canines.

2. While correct tooth alignment and correct intercuspation are important objectives of treatment, these objectives are not to be attained by disturbing the original facial profile line of the patient or by moving the teeth into an area of instability. Disturbance of the facial profile through treatment and instability of end results usually go together.

Nor is an improvement in the facial profile line of my patient, at the expense of a correct intercuspation, considered a successful orthodontic result. Good intercuspation and a good facial line are not mutually exclusive.

3. Any tooth imbalance between the various segments of the dental arches should be adjusted (a) by overcorrection, (b) by spacing or crowding, (c) by slicing, or (d) by extraction.

4. A Class II relationship of the teeth posterior to the canine with good intercuspation should be preferred to a cusp-to-cusp relationship.

All the foregoing principles of practice have one objective—the attainment of the *achievable optimum* in occlusion and of stability within the limitations of each individual patient.

The second group of principles applies to all clinical practice. It is my opinion that the yardstick offered by the *operational approach*[2] of the scientific

method is invaluable to the clinician for the evaluation of statements. This yardstick recognizes four different kinds of statements: *true, false, indeterminate,* and *meaningless,*[3] as defined by Rapoport.

A statement is clinically *true* if all three of the following conditions are satisfied: (1) The statement implies predictions to be tested by conceivable clinical operations. (2) Clinical operations have been carried out to test the predictions. (3) Predictions have been verified by the operations.

If the suggested clinical operations have failed to verify the predictions, we will say that the statement is *false.*

If clinical operations have been suggested but not carried out, we will say that the statement is *indeterminate.*

If no conceivable operations have been suggested, we will say that the statement is clinically *meaningless.*

To apply this yardstick is to witness and hasten the process of changing dental art into dental science.

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TOOTHBRUSHING PROCEDURE FOR ORTHODONTIC PATIENTS

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INTRODUCTION

SEVERAL years ago I taught a survey class in orthodontics for dental hygiene students. I thoughtlessly asked them to prepare a term paper on "Oral Hygiene for the Orthodontic Patient." They wrote very good papers, but one item that was conspicuous by its absence was how the teeth are to be brushed. I then asked the students about this and they said that they could find nothing in the library on the technique of brushing during orthodontic treatment. This made me stop and think! I felt that surely they must have been mistaken. Offhand, I could not think of any reference to give them. Such an important phase of orthodontic practice should not go completely ignored. I then turned to the library to find the required references. I found a large number of related articles, but none which covered the actual technique of toothbrushing while orthodontic treatment was in progress. Since that time I have tried to correlate various articles and to develop a standardized toothbrushing technique which could be taught to the average orthodontic patient.

REVIEW OF THE LITERATURE ON TOOTHBRUSHING

Attempts have been made throughout history to clean the teeth, although the toothbrush as we know it has been developed in the last century.[13] A review of the literature on toothbrushing reveals the following techniques which have possible implications for the orthodontic patient:

1. *Haphazard Method.*—The teeth are brushed by moving the brush in any and all directions that seem advisable to the patient.

2. *Fones Method.*[10]—The teeth are placed edge to edge and the brush is moved in large circles, cleaning both lower and upper teeth at the same time, for the buccal and labial surfaces. The lingual surfaces of the teeth are cleansed by an in-and-out stroke, as are the occlusal surfaces.

3. *Roll Method.*[9]—The brush is placed high in the vestibule with the sides of the brush against the gums. The brush is then moved from the soft tissue down past the occlusal surfaces of the teeth. As the brush is moved against the teeth, the handle is rotated around its long axis

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood that it does not necessarily represent or express the opinion of the Board.

so that the ends of the bristles describe a larger arc than the base of the bristle in the handle of the brush. The lingual surfaces are brushed similarly.

4. *Charters Method.*[7]—(A technique used particularly for patients with periodontal disturbances.) The brush is placed with the tip of the bristles into the interproximal spaces and the sides of the bristles resting against the gingiva. Pressure is then exerted on the brush and it is vibrated several times. The entire mouth is cleansed in this fashion.

5. *Stillman Method.*[24]—(A technique used particularly for patients with periodontal disturbances.) The bristles are placed obliquely to the long axis of the tooth and directed apically. Enough pressure is applied to produce a slight blanching of the gingival tissue and then there is a slight rotation of the brush, care being taken to avoid moving the ends of the bristles so that the periodontium is not injured. After one area is cleansed the brush is moved successively around the arch until all areas are cleansed.

6. *Physiologic Method.*[22]—All the teeth are brushed from the occlusal to the gingival portion in a fashion similar to the normal excursion of food during eating.

7. *Miscellaneous Methods.*—There are innumerable individual variations of these techniques, as well as some less-publicized modifications.

There is a paucity of information in the orthodontic literature on toothbrushing. A number of authors indicate the necessity of proper oral hygiene measures, illustrated by the following quotation from Dolce:[8] "Instruction in proper toothbrushing is an important corollary to orthodontic therapy." However, none give any definite technique. Strang[25] states that he gives to each patient a pamphlet that explains toothbrushing for orthodontic patients. This pamphlet was prepared by Fones,[10] and is excellent. To the best of my knowledge, this is the only material available that directly deals with toothbrushing for orthodontic patients. This pamphlet was printed some years ago, however, and is not readily available.

REASONS FOR BRUSHING THE TEETH

The first thing that comes to mind when considering toothbrushing is that, if properly done, it will reduce the incidence of caries. The old adage, "a clean tooth never decays," implies that our patients should keep their teeth scrupulously clean. Having stressed toothbrushing, we feel that all has been done that need be done and we do not take full advantage of the latest methods of caries prevention. What proof have we that a clean tooth does not decay? Or that we can clean a tooth by brushing it?

Miller[19] formed the chemicoparasitic theory of dental caries, which is now generally accepted. According to this concept, caries is caused by an acid disintegration of the inorganic part of the tooth by acids which are formed from bacterial action on carbohydrates. The organic remainder of the tooth is then

removed by proteolytic action of the same or different bacteria. This theory was strengthened by the work of Williams,[27] who demonstrated the presence of bacterial plaques which confine this action on specific areas of the teeth.

In September of 1947 a workshop was held at the University of Michigan to study the mechanism and control techniques of dental caries.[9] The conclusions they reached were that, although little scientific evidence was available showing a reduction in the caries attack rate, the possibility that adequate toothbrushing would help prevent caries should not be ignored. They also felt that, by brushing, most of the bacterial plaques could be removed from the accessible surfaces of the teeth. However, not all the plaques could be removed from the entire tooth surface. Bunting,[9] in his discussion of one of the papers presented at this workshop, crystallized the thought as it relates to our problem: "There is one type of caries that is positively amenable to cleansing with a toothbrush, and that is the typical cervical caries which can be stopped by proper toothbrushing."

Stephan[23] has shown that the pH is lowered most during the first thirty minutes after ingestion of certain carbohydrates. This fact theoretically would lead to the assumption that the brushing of the teeth immediately after eating would be the most satisfactory method for reduction of dental caries. Fosdick[11] has presented clinical evidence of this. He selected 946 college students, of whom 423 were put into a control group in which they were not to change their brushing habits, and 523 were designated as a test group and were to clean their teeth by brushing within ten minutes after eating, or by rinsing the mouth with water if unable to brush the teeth. He found a 63 per cent reduction in caries the first year of the study. During the second year the reduction in caries incidence was smaller because the control subjects showed less caries activity. This possibly was due to the control group's knowledge of the results of the first year of the experiment. However, when the experimental group is compared with most other studies of caries incidence, the reduction remains over 50 per cent.

Other methods of lowering the incidence of caries have been found and, although not affected by toothbrushing, we must be cognizant of them. Because of their importance, a short discussion of them follows. One of the most logical methods is the restriction in the diet of certain carbohydrates,[14] particularly free sugars. This measure eliminates the material that is converted to acid by the oral flora. This should be explained to each patient, as this is the old tried-and-true method of caries prevention. Another method has been presented by Arnold,[2] who examined the caries incidence in areas that have fluorides in the drinking water and found that there is less caries in these areas than in similar areas where fluorides are not in the drinking water. Knutson and Armstrong,[15] also using fluorides, found that a 36 per cent reduction of new carious lesions occurred in a three-year study of more than 30 children who had fluorides applied topically to the teeth.

There are certain additional prophylactic measures against caries that orthodontists can use for the benefit of their patients. Orthodontic bands should be well formed so that they fit the contours of the teeth as nearly as

possible. Extreme care must be exercised in cementation to be certain that the cement completely fills the space between the band and the tooth surface. This cement seal must be checked at each appointment and if there is any washing away the band should be recemented immediately. Meyers[18] has shown that the etching of teeth under orthodontic bands can be reduced by coating the tooth surface with a cavity lining prior to cementation. Noyes,[20] in studying the incidence of caries in 100 patients during the time when bands are in place and during observation periods, has found an increased caries rate of 0.06 cavities per year while the bands are in place. Although this is an almost insignificant increase, it behooves us to reduce our treatment time to the minimum as a caries-preventive measure. Carlson[6] has suggested placing orthodontic bands on the permanent second molars as a caries-preventing measure. In many orthodontic cases these are the only teeth that are not banded, yet the orthodontist is blamed for causing carious lesions on these teeth. He states that caries in this area is the direct result of improper oral hygiene. Therefore, the placing of orthodontic bands in selected areas is actually a method of preventing the formation of tooth decay.

Fig. 1.—The mouth of a patient who was careless in his oral hygiene, one year after active orthodontic treatment.

Consequently, all the caries control measures that have been discussed should be used in order to keep the formation of new caries to a minimum. Fig. 1 shows the mouth of a patient who was careless in his oral hygiene. This patient was under active orthodontic treatment for eighteen months, and the tooth-moving appliance was removed more than one year prior to this photograph. That area of the tooth surface that was not covered by the band has many etchings on its surface, particularly in those areas that are between the orthodontic band and the gingival tissue. This is the area in which proper toothbrushing could have prevented this injury to the tooth surface.

Toothbrushing is equally important in maintaining a normal gingiva during orthodontic treatment. The orthodontic appliance interferes with the normal stimulation which the periodontium should receive by the excursion of food during mastication. Also, the accumulated debris that lodges around orthodontic appliances that are not properly cleansed by brushing acts as an irritant to the supporting structures of the teeth. This irritant will produce an inflammation of the gingiva. Local periodontal disturbances are caused by inflam-

mation. Fig. 2 shows the mouth of another patient who is careless in his toothbrushing habits. There is a generalized hypertrophy of the gingiva. The interdental papillae between the upper central and lateral incisors are particularly inflamed. Debris can be seen around these and other areas of the mouth. The inflamed areas are tender and hemorrhage easily, so the patient is likely to neglect these areas even more. This produces a vicious circle in which careless toothbrushing leaves debris on the teeth which produces an inflammation of the gingiva, which makes the toothbrushing procedure more difficult.

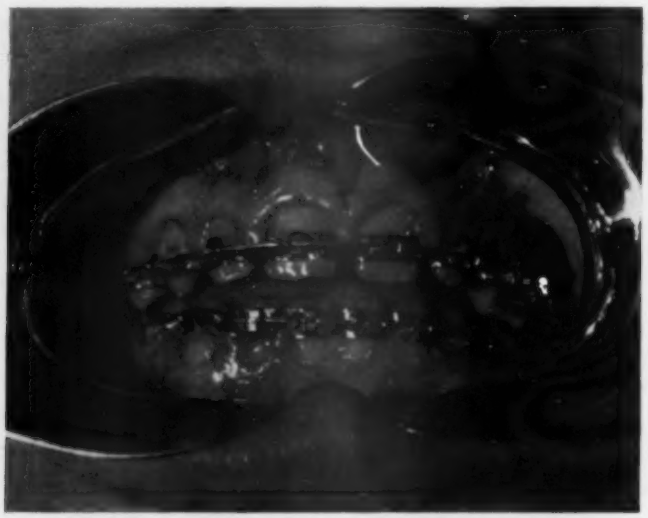

Fig. 2.—The mouth of a patient who was careless in his oral hygiene, during treatment.

Massler, Schour, and Chopra[16] have shown that periodontal disease is not just a disease of adults. In examining 804 children ranging in age from 5 to 14 years, they found that only 36 per cent had normal gingivae and that 15 per cent had severe periodontal disease that was not self-corrective and would require treatment by the dentist.

The orthodontist can do much to prevent periodontal disease in adults by correcting malocclusion. However, insufficient or improper toothbrushing during orthodontic treatment may produce a permanent periodontal injury.

One word of caution is necessary here. I had a 12-year-old patient who repeatedly came for her orthodontic adjustments with inflamed gingivae, which I foolishly blamed on slovenly toothbrushing habits. Later she was in a physician's care for diabetes. After the diabetic condition was controlled her periodontal tissues also improved. This taught me a lesson in that periodontal disease of local origin can be controlled by proper oral hygiene, while some periodontal disturbances that are expressions of systemic disease cannot be controlled by toothbrushing alone.

Halitosis sometimes is caused by food remnants which become wedged around the tooth surfaces.[17] Although all mouth odors are not of local origin, toothbrushing will eliminate fetor oris in many cases.

There are also certain esthetic and psychologic reasons for maintaining a clean mouth. This has been aptly stated by Booker T. Washington[26] in his autobiography *Up From Slavery:* "In all my teaching I have watched carefully the influence of the tooth-brush, and I am convinced that there are few single agencies of civilization that are more far-reaching." This statement from an educator gives us the thoughts of the laity on toothbrushing. Since less than 10 per cent of dental patients have ever been instructed by their dentists on proper mouth care,[12] I feel we are amiss in not thoroughly instructing our patients.

EDUCATIONAL PRINCIPLES INVOLVED

In studying the problem of oral hygiene for my patients, I found it necessary to study the psychology of learning and teaching. For this purpose, I felt that the following generally accepted[3] basic principles should be incorporated in my approach to the problem.

The learner must be interested. I stress the importance of oral hygiene at the time of the preliminary examination of the patient. The parents help in motivating the patient. Because of this, I thoroughly explain the various reasons for brushing the teeth at the time of the consultation, after I have decided upon the treatment plan and before any treatment is instituted. This is followed by complete explanations of the technique of brushing during the patient's first visits while his interest is high. In order to keep this interest, praise is necessary where due. Areas where additional care is needed should be pointed out. Competition sometimes is a help. A well-kept mouth of one patient can be shown to another patient, and both will benefit.

In order to keep the patient motivated during the entire treatment, he must also know why oral hygiene is so important. Therefore, the orthodontist should try to explain the purposes of brushing the teeth. After the patient has been shown how the teeth are to be brushed, he is given an opportunity to brush them. This enables the patient to learn by doing, under the direct supervision of the orthodontist.

In determining which technique of brushing is to be taught, we must consider the past experiences of the patients and then proceed from the simple to the complex. Consequently, I have consulted with the Dental Supervisor* of the Portland, Oregon, public schools, and have based my technique on what all the school children are taught.

MATERIALS NEEDED FOR BRUSHING THE TEETH

There are innumerable types of toothbrushes and I can see no reason to discuss them all here. Rather, I have selected for Figs. 3 and 4 the front and side views of examples of those types most frequently used for orthodontic patients. All these brushes are rather small, as the patients are unable to get around the appliances with the larger brushes. *A* is a conventional natural-bristle toothbrush of rather small size. It consists of ten separated tufts of bristles arranged in two rows with the ends of the tufts cut at an angle forming a wedge. *B* is a

*Dr. Wm. L. Barnum.

Fig. 3.

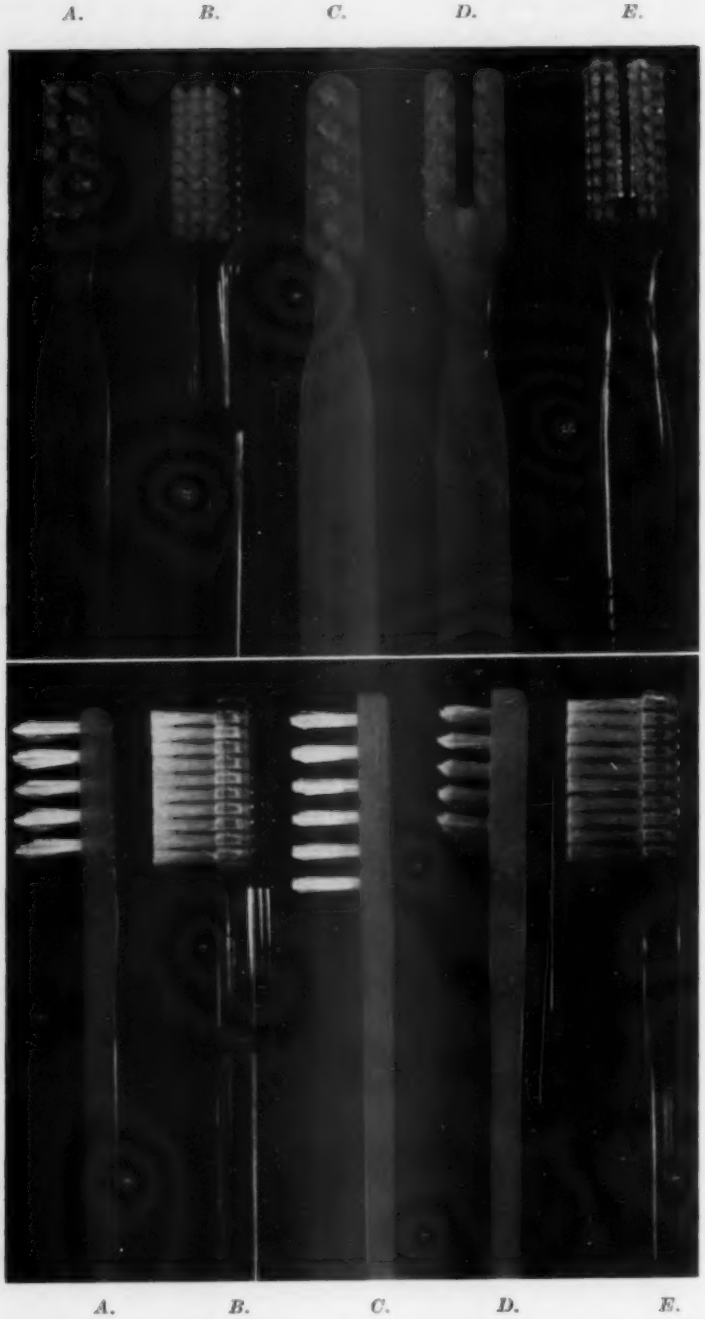

Fig. 4.

Figs. 3 and 4.—The front and side views of frequently used toothbrushes.

slightly larger brush that is made of small-diameter nylon bristles, which produce a softer brush. It consists of thirty separated tufts of bristles arranged in three rows with the ends cut flat. This brush is one of the smallest made of the more flexible synthetic bristles. *C* is a toothbrush made especially for orthodontic patients, and consists of six separated tufts of bristles arranged in one row with the ends of the tufts cut at an angle forming a wedge. It is felt that, because of the one row, the patient is able to clean around the orthodontic appliances more efficiently. *D* and *E*, which are brushes designed particularly for orthodontic patients, have a slot between the bristles. This slot is to be placed over the orthodontic appliance, with one series of bristles to be toward the incisal or occlusal edge of the tooth and the other series toward the gingival tissue. *D* is made of natural bristles and *E* is made of small-diameter nylon bristles.

I do not recommend any particular type of dentifrice. In this I follow the lead of the American Council of Dental Therapeutics of the American Dental Association,[1] which no longer evaluates dentifrices that do not claim caries-inhibitory factors. Those dentifrices containing chlorophyll, penicillin, urea, and ammonium compounds are placed by this council into a category in which further investigation is necessary before their effectiveness can be evaluated accurately. More and more medicated dentifrices are appearing on the market, and, although bacterial numbers can be reduced immediately after brushing, this inhibition is transient and the numbers of bacteria soon increase after brushing.[23] The medicated dentifrices give the patient a sense of security so that he tends to be careless in other caries control measures. Therefore, I do not recommend a medicated dentifrice, although at some future time one might be found of great value. There are three primary functions of a dentifrice: (1) to increase the effectiveness of the brushing by containing an abrasive substance that will help to dislodge food particles and to polish the tooth surface; (2) to make the brushing procedure more enjoyable (for this reason a pleasant flavor is important); and (3) to reduce the surface tension of the saliva so that particles of debris may be removed more readily. Consequently, as long as the patient uses a dentifrice that is not harmful, I do not recommend a change. I tell my patients that an intelligent application of "elbow grease" on the handle of the toothbrush is more important than the particular brand of toothpaste or powder that is used.

A TOOTHBRUSHING TECHNIQUE EMPLOYED DURING ORTHODONTIC TREATMENT

The basic technique I use calls for the use of the small, soft-bristled brush (Figs. 3, *B* and 4, *B*). With this type of brush, the teeth can be adequately cleansed and the damage that can be inflicted is minimized. I furnish one of these brushes to each patient and keep it in the office for the patient's use. I also furnish toothpaste, as paste is easier to apply to the brush and is not as likely to become spilled in the office as toothpowder. The patient receives his first instruction in toothbrushing technique as soon as the excess cement is removed from the first bands that are placed.

The technique that I use is basically the Roll technique.[9] Then toothpaste is applied to a new toothbrush and the technique is demonstrated in the mouth,

Fig. 5.

Fig. 6.

Fig. 7.

Figs. 5, 6, and 7.—The position and stroke of toothbrush as used on the buccal surfaces of the teeth.

with the patient looking in a mirror. For demonstration purposes, the buccal surface of the upper left premolar region is selected, as the stroke here is typical and easy for a right-handed patient to see.

The brush is placed with the tip of the bristles at the mucogingival junction and with the sides of the brush in contact with the soft tissue (Fig. 5). The brush then is brought down over the buccal surfaces of the teeth with a rotary motion in which the ends of the bristles move the farthest and the base of the bristle in the handle moves the least. As the brush sweeps over the free gingiva, it is vibrated mesiodistally so that the bristles go into the buccal embrasures and clean that area (Fig. 6). Then the stroke is continued over the bands and tooth surface (Fig. 7). This type of brushing particularly removes the debris in that area between the free margin of the gingiva and the orthodontic appliance. This is the area of the tooth surface most amenable to toothbrushing as a preventive measure for periodontal disturbances and caries.

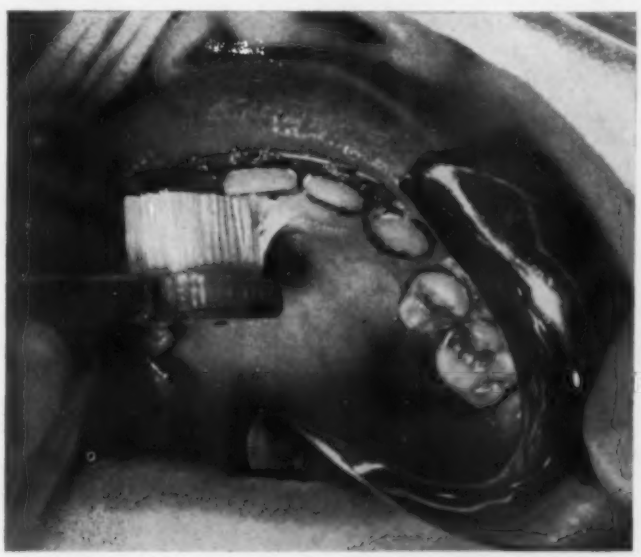

Fig. 8.—The position of toothbrush as used on lingual surfaces of incisors.

The patient practices this technique until he becomes proficient at it in this area. Then a definite sequence of areas to brush is given to the patient. Since the lingual surfaces of the teeth usually are poorly brushed,[21] I recommend that they be brushed first. The teeth are brushed by starting with the most posterior tooth on the upper left side. The position of brush and the stroke are the same as described for the buccal surface of the teeth. When the lingual surface of the posterior teeth has been cleansed, the patient moves the brush to the lingual surface of the anterior teeth. Here it is necessary to hold the long axis of the brush parallel to the long axis of the teeth (Fig. 8). However, a similar type of motion is used with a downward and forward roll. When this has been done, the brushing is continued on around the arch to the lingual surface of the last molar on the right side. Then the upper buccal surface is done

as previously described, starting with the most posterior tooth on the left side and going around the arch to the right. Then the patient starts with the lingual of the lower left area, and goes around the arch to the lingual on the right side. Next he starts on the buccal surface of the lower left side, and moves around to the right. Finally, he brushes the occlusal surface with a back-and-forth stroke.

When the patient is seated in the dental chair and ready for his next adjustment the teeth and appliances are inspected as to cleanliness. Frequently the teeth are not clean and require brushing. The patient then is given the toothbrush that he used at the first appointment. Toothpaste is applied and he is asked to brush his teeth. At the first few visits either my dental assistant or I stay so that we can watch the patient and offer any suggestions or answer any questions that might arise. If the teeth are dirty after the first brushing, the patient brushes again until the teeth are clean. This might involve either a complete following of the technique or emphasis on certain areas that were omitted in the original brushing. I do not use the dental engine for polishing, as I feel it is bad for morale. The use of the hand piece will give the patient the feeling that the toothbrush is ineffective. Instead, I take the patient's toothbrush and show him how to brush those areas which are not properly cleansed.

Often the patient is given time to rebrush his teeth after the arch wires have been removed, if any debris remains. The basic technique must be modified during the early phases of treatment when the teeth are far from the line of occlusion. If certain teeth are in buccoversion, care must be exercised in not damaging either tooth structure or periodontium by excessive brushing, while if some teeth are in linguoversion the tip of the brush must be used to cleanse them.

The brush of choice is a small, soft-bristled brush, as previously described (Figs. 3, *B* and 4, *B*). The small, harder-bristled brush (Figs. 3, *A* and 4, *A*) is satisfactory, but it is more likely to injure the periodontium during the vibratory movements. In those cases where it is desirable to use the harder-bristled brush, I recommend using the Charters technique.[7] The patient first goes over the entire mouth, using the Charters technique, which loosens the debris on the tooth surface between the appliance and the gingivae, and massages the periodontium. This is followed by using the roll technique,[9] which removes all the debris around the teeth and appliances. I also change the sequence of brushing when using the harder-bristled brush. The occlusal surfaces of both upper and lower teeth should be brushed first while the bristles are the hardest (water softens these bristles). The orthodontic brush with one row of bristles (Figs. 3, *C* and 4, *C*) is not used, as the patients can use the sides of the larger brush to reach all areas. The split brush (Figs. 3, *D* and *E* and 4, *D* and *E*) is used only by those patients who cannot master the preceding technique. In using this brush, the split is placed over the arch wire (Fig. 9) and the brush is moved parallel to the arch wire. This brush is efficient for removing the debris from the exposed tooth surface. It is generally agreed, however, that the

horizontal stroke is not acceptable,[5] as it is more likely to injure both the hard and soft tissues of the mouth. In those cases where it is necessary to use this brush, I recommend the use of the soft variety.

This technique has evolved over the last few years, and now it is impossible to give a statistical analysis as to its efficiency as compared with previous patients. However, my patients now seem to have consistently cleaner and healthier mouths. There is less hypertrophy of the gingival tissues during treatment, and there is a reduction in the number of etchings on the tooth surface. Approximately 80 per cent of the patients master the standard technique satisfactorily. Approximately 15 per cent of the patients need to use some of the modifications of the technique which were previously described. Approximately 5 per cent of the patients do not obtain the desired results. Of the 5 per cent whose oral hygiene is unsatisfactory, nearly all can do an adequate brushing in the office but do not take the time to clean the teeth scrupulously between appointments, while a few of the patients do not brush the teeth thoroughly even in the office.

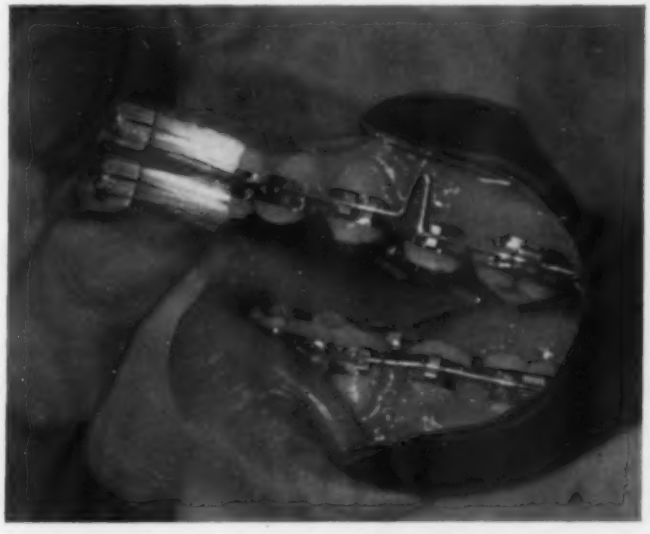

Fig. 9.—The position of split-brush toothbrush as used on labial surfaces of incisors.

I have obtained an additional dividend from stressing oral hygiene. I find that the general practitioner of dentistry appreciates a clean, well-kept mouth, while an unclean mouth of an orthodontic patient reflects deleteriously upon the entire profession.

SUPPLEMENTARY MEASURES FOR TOOTHBRUSH TRAINING

The patient should brush his teeth immediately after eating or, if this is not possible, then at least the mouth should be rinsed with water.

The oral hygiene of some patients has been improved by requiring them to carry a small notebook and write down each time the teeth are brushed and also the time that it took to brush them. The patients are less likely to pro-

crastinate by using this notebook, as they know I will look at it at their next appointment. Although some patients just hold the toothbrush in the mouth and dawdle with it, generally the patients who take longer in brushing do a more thorough job. There is no definite time that the toothbrushing will take, but for most patients it requires about four minutes to do an adequate job. The time, using a clock, is recorded in the notebook at both the beginning and the end of toothbrushing. When the patient estimates the time it took to brush the teeth, invariably his estimate is high. I also feel that the most satisfactory brushing can be done when the patient watches each stroke in a mirror. Not only does the watching of the brush help in removing the debris and in preventing injury, but the patient can check after brushing to see the results obtained! This is the criterion that the patient should use in deciding how long to brush his teeth. When the teeth are thoroughly clean, by visual inspection, the results can be considered satisfactory. At this time the appliance will also shine.

In those patients who find it difficult to obtain the correct neuromuscular control, a device recommended by Blass[4] is used. A locking tweezer is attached to the brush end of the toothbrush and, with the patient holding to the handle, the brush is moved by moving the tweezers.

A collapsible toothbrush is sometimes useful, particularly for those patients who carry a brush for use when away from home, as after lunch at school.

A small rubber cup that is on a handle, like a toothbrush, sometimes helps to get around the gingival tissue. These rubber cups are similar to the cups that are used in the dental hand piece for polishing the teeth.

A small amount of toothpaste is applied to the rubber cup. The cup is then placed carefully on the tooth surface and enough pressure is applied that the end of the rubber cup goes under the free gingiva, and the cup is vibrated. This is particularly useful when there has been a proliferation of the gingival tissue. A piece of cotton applied to the end of a toothpick can be used in a similar fashion.

Gentian violet or other dyes sometimes can be placed on the teeth of those patients who constantly neglect oral hygiene measures. The dye can be removed by proper brushing procedures and the patient can vividly see those areas that have been missed.

The patient also must be shown how the mandibular ramus comes forward in opening, so that when brushing the buccal surface of the upper molars the mouth must not be opened wide.

The left hand can be used to pull away the lips and cheeks in those areas that require special attention.

SUMMARY AND CONCLUSIONS

Oral hygiene has not been adequately described in the orthodontic literature. The importance of toothbrushing has been emphasized time and time again, but *how* the teeth should be brushed, *when* the teeth should be brushed, and *why* the teeth should be brushed have been neglected. There are a number of

techniques of brushing the teeth which are advocated for the patient without orthodontic appliances in place. Here is presented a specific toothbrushing technique for orthodontic patients.

It is questionable just how much of an effect toothbrushing has on the incidence of caries. However, the cavities that occur on the cervical portions of the teeth can be prevented by proper cleansing. The teeth should be brushed soon after eating in order to obtain the maximum benefits of toothbrushing. There are other methods of caries prevention that must not be ignored. They include restriction of sugar in the diet, use of fluorides, proper band construction, proper band cementation, etc. Toothbrushing is equally important in preventing immediate and future periodontal disturbances, and halitosis. Toothbrushing has certain psychologic and esthetic values, as well.

The patient must be properly motivated or he may be one of the many who will not make the required effort to maintain a clean mouth. Consequently, certain psychologic principles must be followed in instructing the patient about oral hygiene measures.

A standardized toothbrushing procedure for orthodontic patients has been presented which has been successful in my practice. Over a period of several years, the oral hygiene of my patients has greatly improved.

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Editorial

"A Mouthful of Wire"

A LETTER to the Editor recently appeared under the above heading in the *British Medical Journal.** The writer of the letter is headmistress of a boarding school and asks the editor, "What is the opinion of the medical profession on the new craze for filling children's mouths with plates and plastic or metal contraptions in order to straighten teeth or alter the shape of the jaw?"

The objections of the headmistress to orthodontic appliances are voiced in the following:

> The children cannot speak properly and can find no pleasure in verse-speaking, or drama or singing lessons, or reading aloud; they find eating difficult and develop unpleasing habits, constantly putting their fingers into their mouths to fiddle with the things. In some cases their nerves are affected by the discomfort and they become tearful or irritable. The plates need frequent adjustment and the wires are constantly breaking. Every time this happens the children miss a half or whole day's school going to see the dentist and as the discomfort is acute when the wires break or become displaced, emergency appointments have to be made, at great inconvenience to all concerned.

The attitude of the headmistress to orthodontic treatment, as expressed in her letter, will have a familiar ring to American orthodontists. We, too, have to deal with school principals who are wholly unacquainted with the whys and wherefores of orthodontic treatment.

A number of replies to the headmistress' letter were published in subsequent issues of the *British Medical Journal.* One of the replies is by G. A. Kerr, of Kent, who hits at the heart of the problem when he points to the ". . . lamentable lack of understanding between members of the team concerned with fostering the interests of our rising generation." Kerr summarizes the problem in the following words:

> The orthodontist must take all factors into consideration before undertaking any treatment, and must reduce his interference to the minimum. The cooperation of the child, the parents, and the school teacher are essential to success. Provided treatment is justifiable, suitably conceived, and efficiently executed, then a little tolerance on the part of the school teacher toward inconveniences caused is a small price to pay for the benefits which can accrue to the child.

*British Medical Journal, p. 361, August 7, 1954.

Orthodontics is not practiced in a vacuum. If the orthodontist will actively seek cooperation from others who are also concerned with his patient, he will find that he has a better chance of obtaining it than if he makes peremptory demands.

A sympathetic school principal with whom we recently conferred on the question related an instance where an orthodontist requested a schoolteacher to excuse a child for treatment during school hours because of a reduction in the fee. The schoolteacher who feels, and frequently is, underpaid has little sympathy or concern with the income of the orthodontist. The size of the orthodontists's fee is no reason for excusing a child from school, as far as the teacher is concerned.

A valid reason for asking that a child be excused for treatment during school hours is the fact that the child is, as a rule, physically unfit after a day spent at school to be subjected to prolonged orthodontic procedures entailing major construction or changes of appliances. The child who sees the orthodontist after school hours usually has to travel at the peak of traffic congestion and after dark. The orthodontist should try to establish an understanding with the school administrator so that children will be excused for part of a school session only. The child should be given a note to present to the school showing the date and time of the appointment and a second note showing the time when the child left the office of the orthodontist to return to school. Requests for excuse of a child should be at spaced intervals so that some child is not absent too frequently on the same day of the week and at the same hour.

Other letters bearing on the subject, which we shall not take the space to quote here, reiterate the well-known fact that our British colleagues possess full understanding of the benefits, implications, and responsibilities of orthodontic treatment. They, like we in America, apparently have not taken the time and effort to seek the cooperation of the "members of the team" concerned with child health, welfare, and education.

An interesting side light on the attitude of the general practitioner of dentistry is to be found in the contribution to the discussion by J. Menzies Campbell, whose name is not unknown to dentistry on our side of the Atlantic. After setting forth the alleged harmful effects of orthodontic treatment, Dr. Campbell comes up with the now exploded benefits of permanent first molar extraction in lieu of orthodontic treatment.

Orthodontics has an important public relations problem confronting it, not only with the patient, the parents, or the school authorities, but also with the medical profession and last, but of equal importance, with the general practitioner of dentistry.

J. A. S.

Reports

EDITOR'S REPORT, AMERICAN JOURNAL OF ORTHODONTICS, 1953-1954

THIS report of the editor-in-chief of the American Association of Orthodontists is respectfully submitted for your consideration. The report covers the fiscal year, 1953-1954.

I would like to bring you up to date again on the eternal illustration problem. For years, one of the major problems of your Editor has been excess illustrations submitted by some authors, and the expense of publication incident thereto. The Editorial and Publication Board partly answered that problem by providing the following directive.

At the annual session of the American Association of Orthodontists in Louisville, Kentucky, the following recommendations of the Publication and Editorial Board were adopted:

1. That many valuable articles are lost for publication because they are not prepared for publication. Therefore, they should be properly prepared.

2. Authors expecting to have manuscripts published, without expense, accompanied by a profusion of illustrations, impose a difficult task upon the editorial staff.

3. That the American Association of Orthodontists should adopt official instruction for essayists, including those of all constituent societies, as to the manner in which manuscripts should be prepared for publication *first*, and for presentation *second*.

The contract between the American Association of Orthodontists and The C. V. Mosby Company provides that a stipulated sum be set up for the illustrations of acceptable articles for publication. Any excess of this budget must be paid out of the treasury of the A. A. O. and may become dangerously expensive.

Accordingly, the A. A. O. passed a resolution in 1949 limiting the cost of illustrations of any one article appearing in the JOURNAL to $75.00, any excess to be paid by the author. This stipulation, however, was changed in Dallas in 1954 to $100.00 as the basic limitation on illustrations for any one manuscript and $25.00 for a case report.

This directive has been of great assistance to your Editor in solving the illustration problem. Particularly has this been of advantage because the publication of this limitation directive has made authors aware of the fact that the illustration problem is not a matter for the personal decision of the

Editor alone. This makes it plain that the Editor is working under a directive of the A. A. O. that provides a definite budget for illustration expense that must be adhered to during the fiscal year.

In order to give the editorial staff more leeway, however, on the illustration matter in 1953, the C. V. Mosby Company, publishers, offered to increase the budget for illustrations by $500.00, provided that the A. A. O. would match that amount. Last year, in Dallas, the A. A. O. accepted that proposition, so that now, with a reasonable amount of care, there is no further problem in regard to the illustration matter. (This will be reported to you fully in the Publication and Editorial Board's report by Chairman Eby.)

An assistant editor, Dr. Earl Shepard of St. Louis, was appointed in Dallas in 1953 and, in addition to that, Dr. J. A. Salzmann of New York, editor of Abstracts and Reviews, was asked to serve as abstract editor with editorial status. This now places the JOURNAL on a more or less three-legged-stool editorial basis, and provides more security to the members of the A. A. O. in case sickness or some other hazard befalls one of the editors.

This new plan has worked out quite satisfactorily, and counsel with the other editors has been of considerable advantage to your editor during the past year.

The Editorial and Publication Board has been of great assistance, particularly the several Chairmen of this Board; over the past years they have been most energetic, loyal, and cooperative in helping to make this JOURNAL a success in continuing its record of publication throughout a period of forty consecutive years without missing a single month of publication. During that time, a grand total of 468 complete journals have gone to press—quite a printed record of your specialty over the years.

Other information in regard to subscribers, finance, etc., I believe, is included in the current report of Dr. Eby, chairman of your Editorial and Publication Board.

May, 1954 H. C. POLLOCK, EDITOR-IN-CHIEF

ANNUAL REPORT OF THE MILITARY AFFAIRS COMMITTEE OF THE AMERICAN ASSOCIATION OF ORTHODONTISTS

DUE to a marked change in the procurement policy of the Armed Services during the past year, the activities of the Military Affairs Committee during this period have been considerably reduced.

As the Korean War drew to a close, or at least reached a stalemate, with the resulting truce, American military action was greatly diminished. Due to the withdrawal of the major portion of our forces in that theater, discharge of personnel was speeded up. With the consequent reduction in the replacement training programs, inductions into the Armed Services have fallen off to a point somewhat similar to that prior to the outset of the Korean action.

This situation, naturally, has alleviated the weight of the necessary services required of the dental officers. While the normal period of active duty for such officers has been shortened somewhat, apparently it was felt that the expanded number of dentists in the Services would be ample (barring further hostilities) to maintain the normal load, since its diminishing curve would still be slightly behind that of the downward trend in line personnel.

Accordingly, calls for the induction of dentists were few during the summer of 1953, and in September the Selective Service System issued a directive cancelling all outstanding orders to report for induction and discontinuing the processing of registrants, at least until June 30, 1954. It is impossible to say what change in policy will take place at the latter date, but obviously the time must come eventually when the replacements will be required to maintain the dental strength of the Armed Services. Not only will many of the officers now on duty have served their time, but also any citizen must recognize the need for larger and better prepared Armed Forces than were contemplated at the end of World War II.

The function of this Committee has not been to seek devious ways to aid our members in avoiding service, but rather to assist those faced with such a problem to organize and distribute their practices and to gain delays in order to minimize hardships for their families, their patients, and themselves. Few cases are likely to be ruled truly essential in private practice by the Selective Service System and the orthodontist who cannot convince himself of this fact is courting trouble, since probably he will only postpone the inevitable until his problems have multiplied to an extent where real damage to his practice may result. Service with the Armed Forces should be recognized as a privilege and a duty with which all American citizens are faced. The sooner he who is fully eligible does seek his place, and has his time in service behind him, the less will the tensions and difficulties of practice tend to pyramid, and he can face the future with a free mind.

During the past year, only three inquiries were received from members of the Association. As to their disposition, two received ample postponements to allow proper arrangement of their affairs, while the third was considered to have reached an age group which, barring unforseen developments, probably would never be touched, as younger men became available.

On the basis, then, of the old saying that "no news is good news," the appearance of only three requests for assistance means that conditions with which the Committee is concerned within the Association are all in good order. It is to be hoped, however, that this period of inactivity has not given those of our members who are eligible a false sense of security, but rather has provided them with the time to consider the situation and govern their affairs accordingly.

Respectfully submitted,

D. Robert Swinehart,
Chairman, Military Affairs Committee

March 30, 1954.

REPORT OF THE NOMENCLATURE COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS, 1954

THE Committee has held no meetings, but the chairman has been in contact with the members. Inasmuch as definite progress in the terminology of our field is being made by conferences on nomenclature held by the American Dental Association, Bureau of Library and Indexing Service, we make no separate recommendations, as they might lead to confusion and be detrimental in the long run. We cooperate in these conferences (first held in 1952, second in 1953) and believe this to be a sound, if not the best, way in which your Committee could function. Dr. Dewel attended the 1953 conference as a representative of the American Association of Orthodontists.

As a matter of record and for your information, we submit the report of the Second Nomenclature Conference, entitled "Supplementing the Dental Dictionary." It includes terms introduced into the dental vocabulary since 1936. The guiding spirit in the development of these conferences and the reports is Dr. George B. Denton of the American Dental Association.

An important phase of the second conference was the paper entitled "The Fundamentals of Occlusion" by Dr. T. M. Graber, Associate Professor of Orthodontics, at Northwestern University. Its contents have particular reference to orthodontic history and nomenclature and it has been published in the February, 1954, issue of the *Journal of the American Dental Association*.

We believe that working with the American Dental Association and participating in these conferences provide orthodontics with a real opportunity to improve its terminology and that we are fortunate in this respect. We believe, therefore, that we may look forward to a constant improvement in general dental terms and that orthodontics will likewise receive marked benefits.

B. F. DEWEL
D. C. MACEWAN
G. M. ANDERSON, CHAIRMAN

In Memoriam

L. C. TROTTER

1913-1954

L. C. TROTTER, Tulsa, Oklahoma, died at his home on Nov. 13, 1954, after an illness of several months.

Dr. Trotter, who was born at Harrison, Arkansas, was a graduate of the A. and M. College and received his dental degree from the Kansas City–Western Dental College and his master's degree in orthodontics from Northwestern University.

Dr. Trotter served four years in the Navy Dental Corps during World War II and was released with the rank of Commander.

He was a member of the Southwestern Society of Orthodontists, the American Association of Orthodontists, the American Dental Association, and the Oklahoma State Dental Association.

Dr. Trotter was a 32nd Degree Mason and a member of Akdar Shrine. He was also a member of the Methodist Church and the Lions Club of Tulsa.

He leaves his widow; two sons, Stephen and Joe Bryon; a daughter, Jacqueline; his father; and four brothers.

Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Bibliografia Odontologica Mexicana. (Mexican Dental Bibliography.) By Dr. Samuel Fastlicht, Dental Surgeon of the National University of Mexico; Former President of the Mexican Association of Orthodontists; Honorary Professor of the University of Guadalajara and of the University of Merida. Limited edition in Spanish. Mexico, D.F.: La Prensa Medica Mexicana, 1954. 220 pages, illustrated.

Fastlicht has rendered Mexican dentistry an outstanding service by the authorship of this book, which presents a bibliography of the contributions of Mexican dentists to dental science. The value of this publication lies not only in its use as a work of reference but also in its historical account of the development of dentistry in Mexico and its influence in Spanish America.

The first book written exclusively on dentistry is the famous *Artzney Büchlein,* published in Germany in 1530, and the first book containing a chapter devoted exclusively to dentistry was published in Mexico in 1552 by the Aztec writer, Martin de la Cruz. Fastlicht's book, therefore, covers a period of four centuries. It is interesting to note that dental literature in the United States boasts of a time span of only a little over 150 years, having begun with the publication, in 1801, by Richard S. Skinner of "A Treatise on the Human Teeth, Concisely Explaining Their Structure and Cause of Disease and Decay."

The work of de la Cruz, known as the *Badianus Manuscript,* was published in an English translation by the Johns Hopkins Press in 1940. Fastlicht disagrees with the use of the term *Badianus* as a designation of the work of de la Cruz. Badianus, a friend of de la Cruz, residing in Xochimilco, translated the work of de la Cruz from the original dialect in which it was written into the Spanish language. The original manuscript is to be found in the Vatican Library in Rome, where Fastlicht had the opportunity to review it on a visit to Rome in recent years. Another book which contains a chapter on dentistry was published in Mexico between 1557 and 1559 by Fray Bernardino de Sahagun, a Franciscan monk. This book gives a description of dentistry in Mexico at the time of the Spanish Conquistadors. Many other works containing chapters on dentistry were published in Mexico during the sixteenth, seventeenth, and eighteenth centuries. In 1709 an ordinance of the Spanish Viceroy prohibited the Barber Surgeons from extracting teeth without first obtaining a license. This antedates the first legal recognition of dentistry as a profession in the United States.

In 1823 there was published in Mexico a book on *Reflexiones sobre La Importancia de conservar la Dentadura Y Manejo Necesario al Efecto, en lo que se incluyen Una Explicacion de los Principios Teoricos de Dentista, Y un Metodo Practico de Curacion en Casos de Abondono"* (Thoughts on the Importance of Preserving the Dentition and the Operations Necessary to Bring This About,

in Which Is Included an Explanation of the Principal Dental Theories and a Practical Method of Treatment in Cases of Neglect). This book was written in English by Guillermo S. Parrott, professor of dentistry, and translated into Spanish by F. L. Delahanty. A number of other books on dentistry also appeared during the nineteenth century. A list of dental books published in Mexico during the first half of the twentieth century is presented.

In addition to the books on dental art and science, there appeared also one in 1951 on *The Art of Dental Mutilation* by Fastlicht and Romero. This is a study on dental mutilation as practiced in Mexico during pre-Columbian days.

Fastlicht mentions the fact that the first dental journal to be published in Mexico appeared in 1887. This journal of twelve pages was published monthly and was owned and edited by Dr. Alfonso Maria Brito, who received the dental degree in 1875 from the National School of Medicine of Mexico. The first Mexican Dental Society was founded in 1887.

The leading dental journal in Mexico today is the A.D.M. the review of the Mexican Dental Association which began publication in July, 1943. This journal is today recognized as one of the leading dental journals.

To those who are familiar with the Spanish language, this book will prove interesting reading and a valuable addition to your library. The student will find here a significant list of bibliographic references and important information of an historical nature with respect to the development of dentistry in Spanish America. Dentists in Spanish-speaking countries and elsewhere will find the book useful, informative, and interesting reading.

Dr. Fastlicht is to be congratulated on the completion of this arduous and exacting contribution to the literature of dentistry.

J. A. S.

The Attachment of the Muscles of Mastication: By N. B. B. Symons, M.Sc., B.D.S., Dental School, University of St. Andrews, Dundee. *Brit. D. J.* **96**: 76-81, February, 1954.

"During the period of skeletal growth, considerable adjustments must be made to the attachments of muscles. These adjustments are essential if the muscles are to maintain their constant spatial relationships to each other and to the bones throughout growth."

Muscles may be divided into two groups:

(A) Those having fleshy attachments which, histologically, are attached to the fibrous layer of the periosteum.

(B) Those muscles which are attached by a tendon and which cannot be removed from the bones without some destruction of the surface of the bone. Histologically, at the region of attachment of these muscles the fibrous layer of the periosteum is deficient and the muscles are attached by means of collagenous fibers which run directly into the bone substances.

"In the first group there is little difficulty in accounting for the method by which these muscles may shift their attachments. By an interstitial growth of the periosteum, different rates of lengthening at different regions allow the periosteum to shift or 'slip' relative to the bone carrying the muscle attachments with it, so maintaining their constant spatial relationships."

In the case of the second type of muscle attachment, the position is less clear, since the muscles are attached directly to the bone and not to the periosteum. It would seem, therefore, that some mechanism must exist to break down or alter this attachment so that the muscles may shift. Among the muscles of mastication, the insertions of the lateral pterygoid and the suprahyoid muscles

into the mandible belong to the second group; to a certain extent also the medial pterygoid and temporal muscles may be considered with this group, since their insertion is partly by tendinous fibers.

At the stage of the 70 mm. human fetus, the secondary cartilage of the condyle forms a large, cone-shaped mass extending ventrally well into the ramus. It is surrounded by a thin layer or collar of bone close to its articular surface and this bone, on the medial surface, is practically coterminous with the attachment of the lateral pterygoid muscle to the condyle. This bone is exactly similar to the perichondrial collar of bone which surrounds the epiphyseal cartilages of a long bone. On the laterial surface, this perichondrial bone extends farther ventrally, but much less far dorsally than on the medial surface.

"The ventral half of the condylar cartilage is calcified and osteoclasts are present on its surface, where some resorption has occurred. A small amount of resorption has also taken place in the midst of the calcified cartilage. The osteoclasts on the surface of the cartilage extend much farther dorsally on the medial than on the lateral aspect, reaching to the level of the most ventral part of the attachment of the lateral pterygoid muscle, but not as yet involving the perichondrial collar of bone in this region."

"Due to the continued formation of secondary cartilage beneath the articular surface of the condyle of the mandible, there is a constant increase in the length of the mandible at this region, until at least the end of the second decade. This growth progressively 'thrusts' the mandible away from the base of the skull and would carry the lateral pterygoid into an abnormal position if some adjustment to the attachment of the muscle did not take place. It has been seen, however, that the lower, ventral, part of the lateral pterygoid is progressively freed from its attachment to the bone of the condyle, this being brought about by osteoclastic resorption. The effect of this resorption is to convert the ventral part of the lateral pterygoid attachment from a tendinous to a 'fleshy' or solely periosteal attachment. This permits, as it were, the condyle to slip inside its periosteal sheath past the lateral pterygoid. The most dorsal part of the lateral pterygoid attachment to the condyle maintains the constant position of the muscle because as it is continuous with the fibrous articular layer of the condyle it is just above the level at which the condylar growth actually takes place.

"The resorption of bone at the condyle is the normal modeling resorption which largely brings about the typical definitive shape of the condyle, with wide head and narrow neck, from the early stage when the condylar cartilage is in the form of a simple cone-shaped mass.

"In a similar manner the growth which takes place at the anterior (ventral) end of each half of the mandible, until the symphyseal suture is obliterated in the latter part of the first year, would gradually tend to separate the anterior belly of digastric and the geniohyoid of the two sides by carrying these muscles more and more laterally. The geniohyoid muscle would, of course, be maintained to a large extent in its correct position by virtue of its attachment to the fibrous tissue of the suture. The bone resorption which occurs on the lingual aspect of the two halves of the mandible near their ventral ends progressively breaks down the attachment of the tendinous fibres of these muscles to the bone so that the attachments become periosteal.

"In the case of the area of tendinous insertion of the temporal muscle it would appear that it is being gradually 'freed' from the bone in a region (the lower part of the anterior border of the ramus of the mandible) which is involved in the resorption of the ramus to make room for the permanent molar teeth and the development of the alveolar process around the teeth.

"The small area of bone resorption seen in relation to the attachment of the medial pterygoid muscle may possibly represent the modeling resorption

concerned in the production of the concavity between the ramus and body of the mandible at its lower border. Here some slight 'freeing' and shift of the muscle may result. For the greater part, the attachment of the medial pterygoid must involve little shift during growth of the mandible but rather a continual expansion as the ramus is increased in area by bone deposition along its posterior border.

"It is interesting to note that recently Baume and Becks (1953) have described the insertions of the medial pterygoid and masseter in the rhesus monkey. In relation to the medial pterygoid, bone resorption was more usually seen, whereas bone deposition was usually found at the insertion of the masseter. In both cases there was no definite periosteum. In human foetal material, however, the masseter is inserted into a fibrous periosteal layer. It is only along the lower border of the mandible, particularly in the region of the angle and to some extent near the base of the coronoid process, that the masseter shows tendinous fibres. This is in accord with the condition in the adult cadaver where it is known that the masseter can easily be stripped from the ramus except at its lower border and near the coronoid process (MacDougall, 1953).

"It is suggested that where bone resorption is found in relation to the tendinous attachment of a muscle, the resorption frees the muscle from the bone as well as performing its primary function of modeling the bone. As a result the attachment of the muscle in this region becomes temporarily periosteal and so can shift relative to the bone and maintain its normal position. This is particularly so in the case of those muscles which are attached close to the growing ends of the mandible, where increase in the length of the bone takes place. When the phase of bone resorption ceases the muscles may be re-attached directly to the bone by tendinous fibres which are embedded in fresh bone deposition."

A Functional Analysis of the Facial Skeleton With Split-Line Technique: By N. C. Tappen. *Am. J. Phys. Anthropol.* **2**: 503-532, December, 1953.

The Benninghoff split-line technique demonstrates the orientation of the minute architecture of compact bone by staining methods. Benninghoff, in 1925, was able to show that some areas of the skull were directionally organized in their split-line patterns, particularly in the face, while other areas, notably the skull-cap, showed no such organization. Benninghoff and Seipel have given evidence that the patterns of organization are related to the mechanical forces acting on the facial skeleton.

Split-line preparations were made on the adult facial skeletons of six human beings and one chimpanzee. Special preparations were made on two dog specimens and one cat specimen for a supplementary problem. Human material in two cases consisted of commercially prepared specimens of unknown provenance and, in four cases, of male dissecting room material. Dentition was good or excellent in all specimens, a maximum of one tooth being missing on any side.

The meaning of the Haversian system organization revealed by the split-lines is not fully understood at present. The response of many split-line systems to mechanical stresses is probable but has not been demonstrated experimentally.

The definite split-line patterns observed in this study are interpreted as a response to pressures and tensions set up in the face by chewing. It is assumed that Haversian systems can be oriented in the direction of either tension or pressure, although Benninghoff and Murray are divided on this question on theoretical grounds.

It should be possible in the future to determine instrumentally the direction of stresses in the bone of living, moving animals. Gurdjian and Lissner used

an electric strain gauge to record tension and pressure areas resulting from blows on the skulls of anesthetized dogs. The instrument is sensitive enough to record much lighter stresses. If it can be adapted to problems of chewing stresses in the living, monkeys with split-line patterns similar to those of human beings could be used to determine the direction of stresses coinciding with major split-line patterns. In the absence of such work, tentative interpretations are presented on the basis of the probable stress systems indicated by the split-lines.

1. Split-line technique was applied to a series of human skulls, a chimpanzee skull, and dog and cat skulls in an attempt to clarify anthropologic problems of facial form.

2. The split-line patterns of the human face show variability in extent and degree of organization in different regions, but the general outlines are clear. The majority of the patterns probably can be explained in terms of response to mechanical stresses on the bone. They are, therefore, an index to one kind of internal adaptation and consequent interpretation of the adaptive nature of some of the characters used in classification.

3. While many split-line patterns probably tend to strengthen the bone, their organization is indicated to be a functional response to stress, rather than an adaptive strengthening mechanism, from the evidence of split-lines in the inferior border of the maxilla.

4. Split-line patterns of the face indicate that upward chewing pressure in the maxilla is interrupted by tension systems coursing along the inferior border of the orbit and through the zygomatic region, associated mainly with the downward pull of the masseter muscle. The lateral orbital border and lateral portion of the brow region are also regarded as being under downward tension. Comparison with the dog and cat stress situation in the equivalent area tends to verify this. This conclusion is in direct contradiction to the usual anatomic and anthropologic interpretations of this region. More centrally, maxillary split-line patterns end along the superior border of the nasal opening, but the deeper system continues in the canine pillar to reach the brow region. The stress situation in the more central brow region remains unclear, since no consistent split-line patterns are observable. The variable situation in the canine fossa region indicates that it is a relatively unstressed area between three divergent stress systems—the infraorbital, zygomatico-alveolar crest, and ascending circumnasal.

5. The chimpanzee differs from man in split-line patterns in several regions. The brow area has continuous patterns, indicating that tension from muscle pull operates over the whole torus. This is probably because the brain case does not overlie the brow region to assist in taking up the stresses. Since there is no elevated nasal bridge, the split-line patterns conform to the deeper portions of the canine pillar. In the maxilla, ascending split-lines are uniformly deviated laterally by the pull of the chewing muscles. Thus there is no region between strongly stressed systems in the face to correspond to the canine fossa region of man. The chimpanzee's infraorbital split-lines are not continuous with the zygomatic origin of the masseter muscle. They are cut off by vertical lines associated with the lateral orbital boundary. The differences from the human pattern are probably a function of the relatively lower origin of the masseter muscle. The absence of a canine fossa in the chimpanzee is probably associated with this stress pattern.

6. Sections of human skulls show that most thickened areas of bone are accompanied by strong split-line systems, indicating adaptation of the thickened structures to mechanical stresses. A notable exception is the central brow region, where thickened bone shows no consistent split-line patterns. Here the form probably does not represent a response to mechanical stresses. This indicates

that stress resistsance is not a primary function of human brow ridges, although in many primate forms they undoubtedly become involved in facial stress systems.

7. The interpretations of split-line patterns made in this study, and their anthropologic applications, can be evaluated in general through instrumental demonstrations. Because of the ready combination of split-line technique with these other methods, it should contribute much more to the solution of anthropologic problems.

An interpretation of Benninghoff's split-line method in relation to orthodontics is contained in an article by Salzmann.* Here it was stated that "the dentition in balance whether in normal occlusion or in malocclusion must be in consonance with the lines of functional stress as demonstrated by Benninghoff." In an editorial, "The Area of Tolerance in Orthodontic Tooth Movement," published in the December, 1953, issue of the AMERICAN JOURNAL OF ORTHODONTICS, Salzmann stated that the teeth exist in a closed functional system which includes the mandible, maxilla, and muscles of mastication, including the tongue. The teeth can be moved successfully in an "area of tolerance" which permits them to remain within this closed functional system in consonance with the lines of stress (trajectories) of the jaws. When moved outside of the area of tolerance, the teeth will relapse and orthodontic therapy will result in failure. The exact area of tolerance in the individual patient is as yet undefinable.

The Human Masticatory Apparatus: An Introduction to Dental Anthropology: By Meyer Klatsky, D.D.S., and Robert L. Fisher, B.A., D.D.S. With a foreword by Wilton Marion Krogman, Ph.B., A.M., Ph.D., and an introduction by Leuman M. Waugh, D.D.S., D.Sc. Published by Dental Items of Interest Publishing Co., Brooklyn, 1953. 246 pages, with 85 illustrations.

As pointed out by Krogman in his foreword, ". . . without the teeth our admittedly incomplete story of evolution would be so pitifully inadequate as to deny any degree of validity." To understand his field of activity better, the dentist should know more of its origins. With this thought in mind, the authors set themselves the task of making morphologic, physiologic, and pathologic comparisons of the masticatory organs of ancient man with those of modern man.

In the chapter on "Evolution and Dental Degeneration," the authors state that the effects of our modern diet and method of food consumption can be altered "if and when we come to realize the dangers they entail to the health and preservation of our masticatory apparatus."

After the discussion of "Factors Influencing Growth and Development" and "Dental Anthropology," we are brought to the chapter on "Diet and Its Effect on the Masticatory Apparatus." The authors pinpoint the importance of mastication, rather than the adequacy of the diet itself as the important factor in dental development when they call attention to the fact that primitive man's dental apparatus was superior to that of modern man, although the latter consumes a much better diet. In the final analysis, it appears that use and disuse of the masticatory apparatus, the authors state, are more important than dietary balance.

Interesting descriptions are provided on the physiology of mastication and the effects on mastication of different foods consumed. The causes, incidence, and prevention of dental caries are discussed. Examinations of dental patients by the authors revealed healthier dentitions among European-born parents who were raised on diets which required prolonged, vigorous chewing than among

*Salzmann, J. A.: Orthodontic Therapy as Limited by Ontogenetic Growth and Basal Arches, AM. J. ORTHODONTICS 34: 297-319, 1948.

their offspring born in the United States who were brought up on a diet richer in nutritive components but which required much less mastication. However, not all persons raised on a diet which requires vigorous use of the teeth in chewing had a high immunity to dental decay. There was no natural racial caries immunity to be found in ancient skulls. The authors hold, with J. Sim Wallace, that caries can be prevented "by radical changes in our food preparation and in our eating habits."

The chapter on "Malocclusion" presents a well-organized outline of the methods of studying malocclusion, its causes, and prevention. Eating habits and other functional factors are stressed in relation to causative factors in malocclusion. Artificial stimulation of the masticatory apparatus of school children is advocated by the authors as a supplement to the natural function of the muscles of mastication which, they point out, can best be stimulated by the use of hard, solid, and fibrous foods.

This worth-while, informative text contains much information not usually discussed in periodic literature or at dental gatherings. Whether or not one fully agrees with the conclusions of the authors, this is an important book for the serious-minded dentist.

J. A. S.

Maxillo-facial Anatomy: With Practical Applications: By Harry A. Shapiro, D.M.D., Assistant Professor of Anatomy, College of Physicians and Surgeons, Columbia University; Visiting Lecturer in Applied Anatomy, Tufts College; Consultant, U. S. Army Medical Service Graduate School, Walter Reed Hospital, Washington, D. C. Published by J. B. Lippincott Company, Philadelphia, 1954. XIV + 392. 314 illustrations (46 in color) Price $12.00.

Shapiro is an anatomy teacher of long experience. He therefore recognizes that the classical teaching of anatomy, which consists of the static description and study of bones, muscles, nerves, blood vessels, etc., is no long sufficient. In this text, Shapiro presents a correlated account of the principles of structure and movement of the anatomic components of the maxillofacial region and the practical application of the principles discussed. The present work, therefore, is different from his former book which confined itself to the "Applied Anatomy of the Head and Neck" only.

The present text goes beyond mere description of normal anatomy and presents also the abnormal and anomalous aspects of the parts discussed in their relation to treatment. Throughout the book attention is paid to basic anatomic knowledge as it applies to actual practice.

In the chapter on "Early Development" is presented a general review of the embryology of the face, the oral cavity, and the development and ossification of the skull. Photographs and line drawings of histologic sections add greatly to the understanding of the descriptive material.

Discussion of the facial skeletion is presented in detail, along with anatomic considerations in fractures of facial bones. The principles of treatment are discussed and illustrated. Many excellent roentgenographic illustrations are included, with appropriate labeling, which should prove of great value in the diagnosis of facial roentgenograms.

A detailed description is presented of the face and facial injuries, such as burns and their treatment. Clefts of the lips and palate are discussed. The term *harelip* which has been generally discarded in favor of *cleft* is here again used by the author.

While his presentation of the anatomy of the oral cavity is detailed, Shapiro avoids prolix discussions which only too frequently lead to confusion. There is

ample evidence in this text of the expertness of the author as a teacher and of his wide knowledge of maxillofacial anatomy. Fig. 145 shows a plaster cast of the mandibular dentition of a 7-year-old child in which the permanent central incisors are lingual to the deciduous central incisors. The author designates this condition as being due to the retention of the deciduous incisors. In view of the fact that the permanent first molars in this child are still unerupted, denoting a somewhat slow dental development, the condition should rightfully be described as a stage in developmental growth, especially since the deciduous central incisors show evidence of undergoing exfoliation and are not contiguous with the permanent incisors. The question of permanent-deciduous mandibular incisor relationship is one that requires further investigation in the interest of preventive orthodontics.

This reviewer is in full accord with the author on the importance of pressure habits affecting the facio-oral zone as a causative factor in malocclusion of the teeth brought about by the resulting alveolar deformation. "Grinding of the teeth," Shapiro states, "is a habit which in children may result in marked wear of the deciduous teeth and also may affect the eruption time of the permanent dentition."

The anatomy of the teeth and jaws of children, as shown on intra-oral roentgenograms, will be found highly instructive. In the chapter on the musculature of the face and jaws, attention is given to muscular habits and the role of the muscles in jaw fractures.

The temporomandibular joint, which looms so large in orthodontic discussions, receives excellent presentation and illustration. This chapter alone would make the book a valuable addition in the library of the orthodontist. Regarding deafness attributed to condylar displacement, the author states, "This is an untenable theory, for any influence which the condyle may exert upon the middle ear or the cochlea is a negligible factor in auditory impairment."

This text can be recommended as a valuable asset to the student and practitioner. A significant bibliography and a detailed index are included.

J. A. S.

News and Notes

Tweed Study Group of the Southwest

The Tweed Study Group of the Southwest held its annual meeting at the Scharbauer Hotel in Midland, Texas, Feb. 20 and 21, with an attendance of thirty-nine members and guests. The following officers presided at the meeting:

President, S. P. Crain, Midland, Texas.

Secretary-Treasurer, Tom M. Williams, Dallas, Texas.

Program Chairman, Joe D. Peak, Austin, Texas.

The program follows.

Alton W. Moore, University of Washington. Late Studies of Facial Growth and the Cephalometer.

James M. Reynolds, Lubbock, Texas. Temporo-Mandibular Joint Radiographs as an Aid in Diagnosis of Class III Malocclusion.

Charles H. Tweed, Tucson, Arizona, presented before and after photographs, cephalograms, and tracings of 100 consecutively treated cases, to substantiate his theory of the importance of the Frankfort-mandibular-incisor angle (F.M.I.A.) in relation to diagnosis, prognosis, and treatment planning.

Dinner at 8:00. Different members were called upon for impromtu remarks.

Alton W. Moore. An Analysis of Class II Treatment Results.

A business meeting was held, and the following officers were elected and installed:

President, Paul E. Gilliam, Houston, Texas.

Secretary-Treasurer, Norman T. Speck, Houston, Texas.

Program Chairman, Marcus D. Murphy, Houston, Texas.

The 1956 annual meeting will be held in Houston, with the date to be set later.

Middle Atlantic Society of Orthodontists

The Middle Atlantic Society of Orthodontists will hold its next annual meeting Oct. 5, 6, and 7, 1955, at the Shoreham Hotel in Washington, D. C. This meeting originally was scheduled for Oct. 23, 24, and 25, 1955.

Northeastern Society of Orthodontists

The annual meeting of the Northeastern Society of Orthodontists was held at the Hotel Commodore in New York City on March 6, 7, and 8, 1955.

A near-record attendance of 550 members and guests registered for the three-day session, which commenced with a cocktail party on Sunday night and closed with table clinics and movies on Tuesday afternoon. A well-balanced program of eleven papers, featuring clinical material, research findings, case reports, and A.B.O. theses, was presented.

As an experiment, the Executive Committee prepared a ten-page mimeographed digest of the tables and statistics containing the very interesting clinical findings in Dr. Germond's A.B.O. thesis. This was done in keeping with a suggestion in Dr. Salzmann's presidential address of 1953-54, and audience reaction to this method of presenting statistical data resulted in an almost unanimous vote in its favor.

The program follows.

A Case Report—Autonomic Orthodontics. Edward I. Silver.
Limitations in Orthodontics. Thomas D. Speidel.
Forces Governing Occlusion in Cleft Palate. Samuel Pruzansky.
The Movement of Vital and Devitalized Teeth in the Macacus Rhesus Monkey. Robert J. Huettner.
President's Address. Philip E. Adams.
A Survey of Current Practice Procedures (Result of Poll Taken in 1953) (A.B.O. thesis). Robert C. Germond.
Memorial Resolution to Dr. Harry Strusser. Joseph D. Eby.
The Use of Improved Tissue-Borne Anchorage in the Treatment of Cases of Extraction and Oligodontia Vera. Walter R. Bedell.
Endocrine Aspects of Dental Maturation. Ralph E. Moloshok.
Variations of Labiolingual Therapy in Class II Cases. William L. Wilson.
Predicting Eruption Sequences of Later Childhood. Thomas Speidel.
A New Improved Method of Treatment of Impacted or Unerupted Teeth (A.B.O. thesis). Harold E. Leslie.
Nutrition in Relation to Bone Formation. Donald Gribetz.

The past presidents were honored at a luncheon on Tuesday, when scrolls were presented in recognition of their services on behalf of the Society. Fourteen were present and received their scrolls in person. Dr. C. A. Hawley's scroll was accepted by his daughter, Dr. Carlotta Hawley. Dr. Glenn Young received his own scroll in addition to that of his uncle, who served as the first president in 1921-22, just twenty years before his nephew.

The first reading of a by-law revision which provides for a historian was held and, pending final approval, incoming President Eugene Kelly appointed Leuman Waugh to act in this capacity. In addition to these officers, the following were inducted:

President-Elect, Oscar Jacobson
Vice-President, Clifford Glaser
Editor, Brainerd F. Swain
Sectional Editor, Joseph D. Eby
Director to A.A.O., Norman L. Hillyer
Alternate Director to A.A.O., Richard A. Lowy
Secretary-Treasurer, Wilbur J. Prezzano.

The autumn meeting will be held Oct. 23, 24, and 25, at the Hotel Commodore in New York City.

Pacific Coast Society of Orthodontists

The Northern Component meets on the second Tuesday of March, June, September, and December.

The Central Component meets on the second Tuesday of March, June, September, and December.

The Southern Component meets on the second Friday of March, June, September, and December.

Northern Component

The regular meeting was held in Salon D, Vancouver Hotel, Vancouver, B. C., Feb. 28, 1955.

Our newly elected chairman, Richard Cline, opened the meeting by calling on Joseph Ryan to introduce our guest clinician, Dr. Egil Harvold of the University of Michigan, who gave an excellent lecture on the treatment of cleft palate cases.

Central Component

On March 8 we had a joint meeting with the California Academy of Periodentology at the St. Francis Yacht Club. Our guest speaker was Dr. Helmut Zander, Dean of Periodentology at the University of Minnesota.

Our afternoon session began at 4:00 P.M. and ended at 5:30 P.M. The topic for the afternoon session was "The Role of Calculus in the Etiology and Treatment of Periodontal Disease."

Southern Component

The regular meeting was called to order by Chairman J. Clifford Willcox on Friday afternoon, March 11, 1955, at Los Feliz Brown Derby.

He then turned the meeting over to Program Chairman Bob Gawley who, in turn, introduced the clinicians for the afternoon. They were George Chuck, Eugene Gould, Dallas McCauley, and George Nagamoto. These men, along with the Program Chairman, discussed "Extraoral Anchorage" as used in their offices.

Central Component

On May 2 to 7, prior to the A.A.O. meeting in San Francisco, a course in the philosophy and mechanics of the twin arch mechanism was given by Joseph E. Johnson of Louisville, Kentucky. The course consisted of lectures and laboratory exercises at the College of Physicians and Surgeons, 344 14th St., San Francisco, California.

Allen H. Suggett Dies

Allen H. Suggett, former orthodontist of San Francisco, California, died March 8, 1955, at Santa Barbara, California, at the age of 87. Dr. Suggett was one of the pioneer orthodontists of the Pacific Coast. A complete obituary will appear in a later issue of the JOURNAL.

Northwestern University

On June 14, 15, and 16, 1955, the Graduate Department of Orthodontics of Northwestern University Dental School will present an advanced course in cephalometric radiography. Applicants are required to have had the Northwestern University basic cephalometric radiographic course or comparable experience and training.

For further information, write to the Director of Postgraduate Study, Northwestern University Dental School, 311 East Chicago Ave., Chicago 11, Illinois.

Temple University

A course in advanced orthodontics, sponsored by Temple University, is announced beginning Jan. 22, 1956. The course will be under the direction of R. H. W. Strang of Bridgeport, Connecticut.

Nair Hospital Dental College

The Nair Hospital Dental College of India is now affiliated with the University of Bombay and will issue a course leading to the B.D.S. degree from June, 1954.

Eastern Association of Graduates of the Angle School of Orthodontia

Through the courtesy of the Orthodontic Historian, Dr. B. W. Weinberger of New York, the JOURNAL has received permission to publish the enclosed program of the Eastern Association of Graduates of the Angle School of Orthodontia at its annual meeting forty-three years ago—three years before the founding of the American Association of Orthodontists.

This program reveals the swing of the pendulum of orthodontic interest that has been so characteristic of orthodontic progress. In 1912 the principal interest in orthodontics was plainly the relation of the nasal fossa to malocclusion of the teeth. Some spectacular results were reported, particularly in *The American Laryngological-Rhinological Journal* in its issue of November, 1912.

The program follows.

SYMPOSIUM ON ORTHODONTIA—CLINIC

Practical Demonstration of Photographs and Specimens Bearing on the Topographical Anatomy of the Upper Alveolar Process and Its Adjacent Air Cavities; Their Functional Significance, and the Therapeutic Value of Modern Orthodontic Treatment.

by the

EASTERN ASSOCIATION OF GRADUATES OF THE ANGLE SCHOOL OF ORTHODONTIA

The American Laryngological, Rhinological and Otological Society.

Philadelphia, Pa., May 14, 1912

Dr. Milo Hellman, Topographical Anatomy.
Dr. F. L. Stanton, Physiology.
Dr. J. Lowe Young, Treatment.
Dr. E. Santley Butler, Treatment.
Dr. B. W. Weinberger, Bibliography.

LITERATURE PERTAINING TO THE OPENING OF THE MAXILLARY SUTURE

Frenum Labium and Its Relation to Intermaxillary Suture. Ketcham, A. H. The American Orthodontist, 1907, June, pp. 36-44.

Expansion of the Dental Arch and Opening the Maxillary Suture in Relation to the Development of the Internal and External Face. Herbert A. Pullen. Dental Cosmos, 1912, May, pp. 509-528. Discussion, pp. 485-592. Important.

A Study of the Maxillary Sutures. Wright, C. H. Cosmos, 1911, p. 633.

A Group of Deformities of the Nasal Respiratory Tract, Coincident With Dental Irregularities. Wright, G. H. Cosmos, 1912, March, pp. 261-269.

Dental Impaction and Preventive Treatment. Barnes, V. E. Cosmos, 1912, January, pp. 1-21.

Rapid Separation of the Superior Maxillary Bones to Relieve Deflected Nasal Septum and Contracted Nares. Willis, F. M. Cosmos, 1911, p. 784.

Spreading the Maxilla Versus Spreading the Arch. Ottolengui, R. Items of Interest, 1904, pp. 836-855.

Treatment of Irregularities of the Permanent Teeth. Angell, E. C. Cosmos, 1860, May, p. 540; June, p. 599.

The Influence of the Nose of Widening the Palatal Arch. Dean, L. W. Journal of the American Medical Association, 1909, p. 941.

The Relation Between Deviation of the Septum and Irregularities of the Teeth and Jaws. Black, N. W. J. A. M. A., 1909, March, p. 943.

Stenosis of the Nasal Cavity Caused by Contraction of the Palate and Abnormal Position of the Teeth. Pfaff, W. Cosmos, 1905, pp. 570-573.

The Application of Orthodontia Principles to the Prevention of Nasal Diseases. Brown, G. V. I. Cosmos, 1903, pp. 765-775.

Development and Surgical Relations of the Nose and Mouth. Brown, G. V. I. Iowa Medical Journal, 1910, February, p. 373.

The Surgical and Therapeutic Aspect of Maxillary Readjustment, With Special References to Nasal Stenosis. Brown, G. V. I. Cosmos, 1909, pp. 7-17.

Clinical Results in the Surgical Treatment of Hare Lip and Cleft Palate. Brown, G. V. I. Cosmos, 1908, pp. 124-140.

Nasal Occlusion and Septal Deviation in Their Relation to Antral Development and Facial Expression. Copeland, R. Cosmos, 1903, p. 136.

LITERATURE PERTAINING TO ORTHODONTIA

Orthodontia. Angle, E. H. Dental Review, 1896, p. 171.

Classification of Malocclusion. Angle, E. H. Cosmos, 1899, p. 249; 1909, p. 343.

Importance of the First Molars in Relation to Orthodontia. Angle, E. H. Cosmos, 1903, March, p. 173.

Some Basic Principles in Orthodontia. Angle, E. H. International Dental Journal, 1903, October, p. 729.

Some Studies in Occlusion. Angle, E. H. International Dental Journal, 1905, March, p. 165.

Orthodontia. Angle, E. H. Dental Digest, 1904, March, p. 307.

Bone Growing. Angle, E. H. American Orthodontist, 1910, pp. 61-77.

Ideal Occlusion of the Teeth. Dewey, M. Dental Digest, 1906, p. 40.

Importance of Dental Orthopedics in the Normal Development of the Child. Gough, F. A. American Journal Obstetrics, 1909, p. 712.

Function of the Teeth in the Development of the Child. Hawley, C. A. Cosmos, 1910, October, pp. 1053-1066.

The Relation of the Teeth to the Development of the Jaws and Teeth. Noyes, F. B. American Orthodontist, 1912, pp. 133-1431; Journal of the American Medical Association, 1911, pp. 473-477.

The Alveolar Process. Noyes, F. B. American Orthodontist, 1904, p. 103.

A Study of the Peridaental Membrane. Noyes, F. B. Items of Interest, p. 752.

Tissue Changes, Particularly of the Bone, Incident to Tooth Movement. Oppenheim, Albin. The American Orthodontist, 1911, p. 57; 1912, p. 113.

Notes of Interest

Dr. Jerold F. Ahlfs, orthodontist, announces the opening of his office at 409 Blount Bldg., Fort Lauderdale, Florida.

Dr. Robert C. Germond announces the removal of his office from 705 Hotel Jamestown Bldg., Jamestown, New York, to Medical Arts Bldg., 500 Pine St., Jamestown, New York, practice limited to orthodontics.

Lawrence F. Graves, D.D.S., 9 Rittenhouse Pl., Ardmore, Pennsylvania, has entered the exclusive practice of orthodontics as of Jan. 1, 1955.

Herbert L. Hayward, D.D.S., Ph.D., announces the removal of his offices to Lakeville Professional Bldg., 2035 Lakeville Rd., New Hyde Park, New York, practice limited to orthodontics.

Dr. Theodore L. Jerrold announces his return from overseas military duty to resume the practice of orthodontics, with offices located at 359 New York Ave., Brooklyn, New York.

Dr. Edward A. Lusterman announces the association of Dr. Kenneth M. Platzer in the Rockville Centre Medical Bldg., 165 North Village Ave., Rockville Centre, New York, practice limited to orthodontics.

R. Leonard Weinberg, D.D.S., announces the opening of his office at 147-14 Sanford Ave., Flushing, New York, practice limited to orthodontics.

OFFICERS OF ORTHODONTIC SOCIETIES

THE AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS is composed of a representative of each one of the component societies of the American Association of Orthodontists.

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